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The Phase of Illness Paradigm: A
Checklist Centric Model to Improve
Patient Care in the Burn Intensive
Care Unit

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14. ABSTRACT We will develop the checklists for the POIP using cognitive systems engineering methodologies and iteration. To validate the model, we will measure clinician perception of patient condition and care priorities; we will observe the frequencies that healthcare teams complete key elements of patient care; and we will measure communication, teamwork, cognitive work load, and provider quality of life before and after units implement the POIP. To assess the model's effect, we will observe patient outcomes and complication rates before and after units implement the POIP. To further assess the model's capacity to rapidly incorporate new knowledge into burn critical care, we will update the phase specific checklists six months after initial implementation and continue data collection.					
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A. Introduction

This project seeks to validate the phases of Illness paradigm (POIP) (Pamplin 2011) and its effect on a variety of measures in three Burn ICUs. This paradigm describes patients with similar illness severity for which clinicians define standard goals of care, treatment objectives, and specific care tasks. Checklists may help to identify a patient's illness severity and priorities of care as they progress or regress through the continuum of illness during their time in the ICU. Within each "phase of illness" – or range of illness severity – phase-specific checklists may help ensure adherence to local protocols, best practices, clinical guidelines, and specific care bundles. These checklists may help to standardize supportive care elements such as types of monitoring, frequency and type of laboratory assessment, sedation strategies, modes of mechanical ventilation, and physical therapy interventions. Through this standardization, the POIP may create a shared mental model of patient care amongst clinicians in the BICU and thus enhance distributed cognition (Hutchins 2000) and assist the work of the multidisciplinary ICU care team. The objectives of this program are as follows:

- a. Understand the work domain in the Burn ICU in terms of patient condition, patient progress, and dependent clinician behaviors in order to create ecologically valid checklists that support clinician work including decision making according to the Phases of Illness Paradigm.
- b. Validate the Phases of Illness Paradigm and its effect on a variety of measures in three Burn ICUs
- c. Implement the POIP to improve the multidisciplinary burn ICU team's understanding of patient illness severity, daily care priorities, and anticipated care goals.

B. Keywords

Team, Communication, Burn Intensive Care, Illness severity, Care Goals, Clinical Decision Support Tools, Phases of Illness, Cognitive Workload, Quality of Life, Card Sorting

C. Overall Project Summary

This project seeks to understand the work domain in the Burn ICU in terms of patient condition, patient progress, and dependent clinician behaviors in order to create ecologically valid checklists that support clinician work including decision making according to the Phases of Illness Paradigm. We will implement the POIP to improve the multidisciplinary burn ICU team's understanding of patient illness severity, daily care priorities, and anticipated care goals. This project aims to validate the Phases of Illness Paradigm and its impact on a variety of measures in three Burn ICUs. In addition, we aim to further develop the Phases of Illness Paradigm by investigating the ecology of clinical behaviors in the team environment it is meant to support. Using surveys, we will evaluate the perception of the clinicians implementing the checklists on teamwork and communication effectiveness.

The objectives of this program are as follows:

- a. Implement the POIP to improve the multidisciplinary burn ICU team's understanding of patient illness severity, daily care priorities, and anticipated care goals.
- b. Understand the work domain in the Burn ICU in terms of patient condition, patient progress, and dependent clinician behaviors in order to create ecologically valid checklists that support clinician work including decision making according to the Phases of Illness Paradigm.

- c. Validate the Phases of Illness Paradigm and its effect on a variety of measures in three Burn ICUs.

The project tasks are as follows:

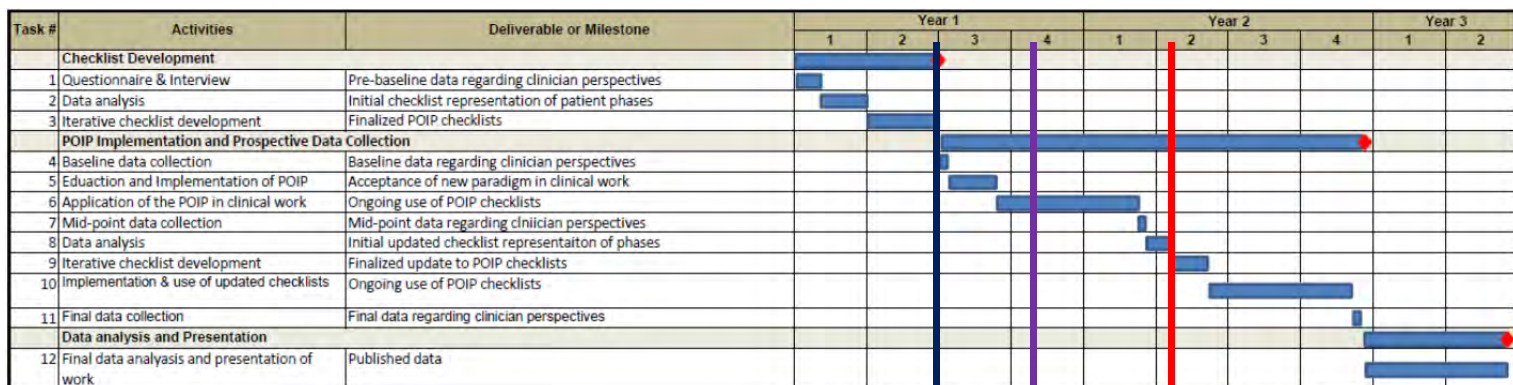
TASK ONE: Describe the patient progress through intensive care from patient-centric and provider-centric perspectives. This will include identification of general patient characteristics, provider perspectives, care priorities, therapeutics, activities, and care team goals at various times during a notional patient's progress through intensive care.

TASK TWO: Using the information discovered in task 1, create a representation that maps patient progress through the ICU in the form of checklists that identify patients' and care team goals, objectives, and tasks that are commonly associated with a patient's current condition (i.e. "phase of illness").

TASK THREE: Implement the phases of illness paradigm in three Burn Centers and assess its impact on provider understanding of patient status, care priorities, patient outcomes, and effect on communication, teamwork, quality of life, and cognitive workload. Comparative data for providers and patients will be obtained/initiated throughout the project beginning in month 3.

TASK FOUR: Review and update the Phases of Illness Paradigm (POIP) checklists and assess the time it takes for new checklist items to be reliably completed without new/additional education for the healthcare team.

1. Gantt Chart



Key: red line = Core Site progress; purple line = Houston Site progress; dark blue line = Dallas Site progress

2. Project Summary by Task

TASK ONE. Describe the patient progress through intensive care from patient-centric and provider-centric perspectives. This will include identification of general patient characteristics, provider perspectives, care priorities, therapeutics, activities, and care team goals at various times during a notional patient's progress through intensive care.

Two data collection tools were used in this part of the study to describe patient condition: the condition understanding survey (CUS), and the clinician card sort tool (CCST).

Condition Understanding Survey (CUS)

The CUS survey asked clinicians to identify illness severity on a scale from “Most sick, could die today” to “Least sick, could transfer.” In addition, clinicians were asked to indicate what the top four goals, objectives and tasks were for that patient. The clinicians were also asked to indicate the same information about the patient for the following day—or their prediction of how sick the patient would be. Goals were defined as *short-term* desirable outcomes for patients, objectives were defined as activities a team would accomplish to achieve a goal, and tasks were defined as an individually assigned piece of work. The responses are then coded by the researchers (principle investigator and core site research nurse).

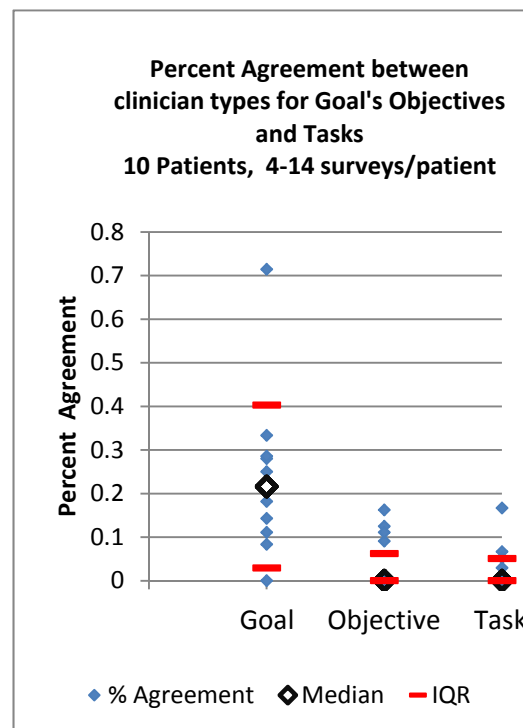
Findings

Data analysis from the CUS surveys is ongoing. All three sites have completed pre-baseline CUS data collection, representing 171 surveys. Further coding and analysis will continue during year three of the project. Preliminary data suggests the following conclusions:

1. Although definitions for patient “goals,” healthcare team “objectives,” and clinicians “tasks” were provided, clinicians have difficulty phrasing daily care priorities in these terms and often combine these items in terms when identifying treatments for patients. An example of a written “goal” is as follows:
 - a. “To tolerate tilt at 60 degrees for weight bearing and pulmonary rehab.” This statement from an occupational therapist contains the following six coded elements:
 - i. Goals: 1. Maintain or Improve functionality and 2. Maintain or Improve Lung Function
 - ii. Objective: 1. Weight bearing to improve/maintain functionality and 2. Physical Activity for Pulmonary Rehab to improve/maintain lung function
 - iii. Tasks: 1. Tilt Table for weight bearing for a specified time (actor not specified) and 2. Tilt Table for Pulmonary Rehab (actor not specified)
2. Clinicians’ perspectives on priorities of care are usually focused on their own specialty. In other words, nurses, physicians, rehabilitation specialties, respiratory therapists, nutritionists, etc. usually have their own, specialty specific agenda which they prioritize over, or in exclusion of, other care elements for any given patient on any given day. Examples of clinician top “goals” for the same patient are follows (uncoded):
 - a. Occupational Therapist: “To tolerate tilt at 60 degrees for weight bearing and pulmonary rehab,” “To tolerate sitting in TLC for increased activity tolerance,” “To tolerate passive range of motion (ROM) active assist ROM to increase functional use of B UE/LE,” and “To tolerate coban wrap to B hands for proper edema management to prevent long term joint contracture.”
 - b. Dietician: “tolerate trophic TF,” and “correct free water deficit”
 - c. Nurse: “maintain oxygenation and ventilation,” “monitor for hypovolemia,” “monitor for electrolyte balance,” and “balance activity and rest.”
 - d. Physician in training: “Liberate from vent.”
 - e. Burn surgeon: “Liberate from vent,” And “begin enteral feeding.”
3. Although the healthcare team works closely together, conducts daily multidisciplinary rounds in an effort to create a shared understanding of the patient condition and care plan, individual clinicians prioritize care elements quite differently. Coding of the above clinician described “goals” has *thus far* yielded 77 identified goals, 115 objectives, and 284 identified tasks (appendix A). Thus far, coded data in patients where at least 4 CUS’s were returned for 10 different patients identified the following:

10 Patients 4-14 Surveys	# of Coded Utterances	Mean Agreement
Goals	7-25	21.6%
Objectives	7-37	4.9%
Tasks	10-34	3.2%

4. Although one there are many therapeutic options in the ICU and care in this environment if complex – the problems set, that is the number of goals, objectives, and tasks of care for a given patient appears to be measurable and bounded. This suggests that with further study, we may be able to develop increasingly refined models of care within the Burn ICU and could identify increasingly refined tools to support it.



Clinician Card Sort Test (CCST)

We developed the CCST through serial interviews with experts in burn critical care from the core site. The interviews discovered 10 categories of information that clinicians use to perceive patient condition (“features”) and 9 categories of care elements (“treatment”) that were used to manage patient care. This resulted in 97 total cards; 67 features and 30 treatments. Prior to beginning the card sort process, clinicians were asked to identify their patient’s illness severity on a scale from “could die today” to “could leave the ICU today.” Then, the participant reviewed the feature cards, selecting all those that they considered important to how they determined the patient’s illness severity. Through a guided and scripted process with the researcher, the participant organized the cards from most important to least along a grid (See Appendix A for two card sort examples). This process was repeated using the treatment cards. If a card was not present, the participant could use a blank card and create one. After reviewing the final card arrangement, participants were asked if the arrangement of cards was an accurate representation their perception. Finally, treatment cards were organized by goal, objective or task.

The CCST helped clinicians “unpack” their complex, intuitive understanding of patients and how they prioritize information and treatments. Using this method, clinicians were able to identify a patient’s severity of illness, the information they use to make this identification, and what treatments they consider important.

CCST data collection is complete at all sites. We completed 77 card sorts representing clinician perspectives on 169 patients. Time spent completing the sort averaged 35.5 minutes (range: 10-100). Participants chose an average of 9 cards for the feature sort and 8 for the treatment, with few choosing to create unique cards.

Findings

1. Mental models of patient condition and treatment priorities are highly variable and change according to:
 - a. patient condition,
 - b. institution,
 - c. profession or clinician type,
 - d. and years of experience.
2. Clinicians consider patient condition along a continuum versus in discrete phases.
 - a. Treatments and their priority change according to clinician perception of patient illness severity along this continuum.
 - b. There is considerable overlap between how clinicians perceive patient condition.

These observations led to discussion between the principle investigators and the projects cognitive systems engineering (CSE) consultant, Dr. Nemeth, regarding the project assumption that we could apply discrete phases of care to patients within the burn ICU: Describing discrete phases of patient condition or treatments was NOT supported by the data. Instead, the data necessitated further investigation and development of a model that 1) acknowledges that the changes in patient condition as they pass through critical illness is a continuous, not discrete phenomena, 2) allows clinicians to perceive patients differently along this continuum, 3) facilitates dialogue between clinicians about these differences in perception, 4) provides clinicians with recommendations and/or considerations of what to do for like patients at any point on the continuum of care. The final two aspects of the model may help novice clinicians better communicate with and/or understand the perspectives and priorities of more experienced clinicians.

Using these findings, the principle investigator in collaboration with the CSE consultant developed prototype cognitive aides for testing during task two, checklist development. Checklists tools may take many forms and for the purpose of this project, the investigative team has started calling them by a more accurate term – cognitive aids. This change in terminology has come about for a variety of reasons, the most important of which is the negative connotation that “checklist” has in health care environments. Clinicians refuse to believe, and rightly so, that patient care is only as complicated as flying a plane. Instead, patient care is complex, emergent, and non-linear. Indeed, others have recently reported about the realities of checklists – they do not change clinician behavior and do not improve patient care alone (Urbach 2014). Instead, it is this research team’s belief, that these benefits are only realized when the underlying medical culture of the team using the checklist changes to support improved communication. Tools can help teams change. Our previous use of daily checklists and read-back task lists empowered nurses to speak up and participate in the multidisciplinary rounds process (Newkirk 2011), and we anticipate a similar effect of this tool on other clinician groups, particularly the novice and non-nurse, non-physician clinicians in the burn ICU.

These findings have been presented national meetings (see below).

TASK TWO. *Using the information discovered in task 1, create a representation that maps patient progress through the ICU in the form of checklists that identify patients’ and care team goals, objectives, and tasks that are commonly associated with a patient’s current condition (i.e. “phase of illness”).*

Each site created two tools that are similar in function, but differ in design and content. The first tool is a “scales” tool that represents how clinicians think about their patient’s condition (conditional assessment), severity of illness assessment (SOI), and a treatment assessment (See Appendix C). The patient’s bedside nurse assesses the patient’s condition by making marks along several continuous scales representing the most important features from the CCST data. These scales differ at each site:

Comparison of Conditional Assessment Scales at each Participating Site		
USAISR	Houston	Dallas (proposed)
Acuity Level	Acuity	Acuity
Diagnosis & Problems	Diagnoses & Problems	Diagnoses & Problems
	General Condition	General Condition
	Organ Failures	Organ Failures
Organ Support	Organ support	Organ support
		Medications
	Labs/ABG/pH	Labs/ABG/pH
	Mechanical Ventilation (Peep/Mode)	Mechanical Ventilation
	FiO2/Oxygenation (P:F, SpO2)	Respiratory Therapy
	Monitors/Interventions	
Mental Status	Mental Status	Mental Status
Wounds	Wounds	Wounds
		Rehabilitation

Risk Of Worsening Or Sepsis	Risk of Worsening or Sepsis	Risk of Worsening
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The SOI scale is a color bar that transitions from red on the left representing “Most sick, could die” or “Most sick, Potential Demise”, to orange, yellow, and green or “least sick, could transfer.”

USAISR SOI Scale

Severity of Illness (your summary assessment of the above scales)



Houston and Dallas SOI Scale

Illness Severity
(summary
assessment)



A comparison of the treatment scales at each site follows:

Comparison of Treatment Assessments at each Participating Site		
USAISR	Houston	Dallas (proposed)
Analgesia & Sedation	Analgesia & Sedation	Analgesia & Sedation
Sleep	Sleep	Sleep
Ventilation	Mechanical Ventilation	Mechanical Ventilation
Monitoring	Monitoring	Monitoring
Nutrition	Nutrition	Nutrition
Fluid Goal	Fluid Goal	
CRRT (Continuous Renal Replacement Therapy)		Medications
Labs	Labs	
Access	Access	
Wound Care	Wound Care	
Rehabilitation	Medications	
Medications	Rehabilitation	Rehabilitation

Each scale, both condition and treatment, is a continuous scale with language along the scale representing features that correspond to certain points going from most sick on the left, to middle sick, and finally to least sick on the right. From the CCST data, we were able to match this language with SOI scores. For example, in the “diagnosis & problems” condition scale goes from “getting worse quickly” on the far left (sickest) to “better quickly” on the far right (least sick) (see below).

Diagnoses & Problems Worse = Increasing in number or severity; Better = Decreasing in number or severity



Using the Phases of Illness Paradigm (POIP) as a theoretical model for this project, we hypothesized that conditions and treatments align along a continuum. Therefore, the checklist tool, called the “scales tool” reflects the CCST data we gathered and validates the POIP as a model for care. We found we were able to

link SOI scores to certain conditions and treatments. The result is a series of conditional scales that when used reflect a visual model representing either care that is aligned (condition matches treatment) or care that is misaligned and discordant with the patient condition.

The scales tool is intended to function as a twice daily assessment of patient condition and treatments. However, the tool is also intended to assist novice clinicians make treatment recommendations or to communicate to other clinicians on the MDT. For example, if the clinician notices that the patient's condition has gone from middle sick to most sick but the treatments have not changed, thus representing discordant care, the clinician can recommend a change in treatment to better align care.

The second tool is called the "Team View." It amounts to dry erase board located outside each patient's door on which important longitudinal information is maintained for situational awareness and around which the multidisciplinary team "huddles" during daily patient rounds in order to plan care (See Appendix D). The Team View has a SOI scale across the top where the nurse's daily SOI assessment is tracked for up to 21 days. An overlay exists if the patient exceeds the average length of stay of 21 days. Below that, there is a section that tracks key patient activities such as procedures, operating room (OR) days and days when burn dressings are changed. There is a section that has check boxes to highlight the status of key quality metrics that are commonly tracked in the burn ICU such as deep vein thrombosis prevention and ventilator bundle compliance. In addition, there are check boxes tracking whether the family needs to be updated or if the patient has had a bowel movement. There is a box section that tracks the current intravenous antibiotics, their start and stop dates, and their indication for use. There is another checklist that indicates the fluid volume goals for the day (positive, even, or negative). Lastly, there is a fill-in section to indicate the most important goals for the patient.

These findings were presented at regional and national conferences (see below).

TASK THREE. *Implement the phases of illness paradigm in three Burn Centers and assess its impact on provider understanding of patient status, care priorities, patient outcomes, and effect on communication, teamwork, quality of life, and cognitive workload. Comparative data for providers and patients will be obtained/initiated throughout the project beginning in month 3.*

After education, the core site began piloting the tools in August 2014 with implementation in October 2014 (See Appendix E). Description of the two tools developed at the core site are in "task one" above. The Houston site's tools were piloted in March 2015. Two tools were developed at this site similar to the core site's final rendition. However, language on the scales and bedside "Checklist" (Team View) reflects the data from the Houston card sorts and serial group interviews. The scales tool is similar to the core site and description above. Instead of one sheet, like the core site, there are two sheets of paper, one with the current condition and SOI assessment and the other with the corresponding treatments (See Appendix C).

The Houston site's bedside checklist is also similar to the core site's Team View, but instead of 21 days, there is only one week of data. This reflects the different length of stay and the needs of the unit. Like the core site's Team View, there are overlays available if the patient exceeds 7 days. There are checklist items to track the bundles, antibiotic start/end dates and indication for treatment, fluid goals, and major goals for the next 24-48 hours, and priorities of care to achieve these goals (See Appendix D).

The Dallas site is the last to implement tools and was in the development phase (group interview and Delphi) at March 30, 2015. Preliminary data show a major difference at this site with the addition of the wound assessment figures (Lund and Browder) and a "major problem list." The Dallas Team View tracks patient SOI and status for 21 days, similar to the core site (See Appendix D). The scales tool is due to be complete by April 2015.

To assess workload perception we used the National aeronautics and space administration task load index (NASA-TLX). We used the TeamSTEPPS perception questionnaire (TPQ) to assess teamwork perceptions among staff.

NASA-TLX

The NASA-TLX is a tool developed to assess cognitive workload across six scales: mental, temporal, performance, effort, frustration and physical. Baseline (pre-implementation) NASA-TLX data from all three sites assessed workload perception differences among clinician types, years of experience, institution and time spent with a patient. We sought to characterize clinician subjective sense of workload when performing two tasks.

1. Identify if the patient is better, same, or worse than yesterday (severity of illness (SOI)).
2. Identify the most important objectives of care for the patient today (priorities of care (POC)).

After multidisciplinary rounds (MDR) on one patient the entire clinical team present was asked to assess their workload perception associated with those two tasks. For statistical analysis, we grouped clinicians into the following groups:

- Student: medical students
- Nurse: all types including registered nurse (RN), licensed practical/vocational nurse (LPN/LVN), clinical nurse specialist (CNS), etc.
- Physician: all attending physicians (burn surgeons, intensivists), fellows and residents.
- Other: all other credentialed providers not represented in any other category.

Findings

We completed surveys on 116 clinicians, 5 MDR at each of the 3 sites representing 13 students, 25 nurses, 14 attending physicians, 18 residents, and 37 in other roles. Mental, temporal, performance, and effort were the primary determinants in equal proportions for the cognitive work performed for the identified tasks on MDR. Providers with fewer years of experience have higher perceived workload for both tasks compared to those with more experience. Students perceive more mental and overall total load for both tasks than all groups. Non-physician, non-nurse providers as a group perceived less workload for both tasks than nurses and physicians. In addition, physicians and nurses experienced significantly more temporal demand completing these two tasks than do non-physician non-nurses. We did not detect any significant differences among the different sites or among providers with different hours of time spent with the patient.

This data establishes a baseline for the workload perceived by clinicians overall (moderate; 42/100). After implementation, we can compare post-intervention NASA-TLX scores to identify if positive changes (reduction in scores) occurred due to tool implementation.

This data was accepted for presentation at a national conference (see below).

TeamSTEPPS

The TeamSTEPPS-Teamwork Perceptions Questionnaire (T-TPQ) was completed at all three sites to establish baseline teamwork perceptions among clinicians. This tool was specifically designed for health care and has been validated across many different types of clinical settings.

Findings

The T-TPQ data has been collected at all three sites. We collected 129 surveys (physician: 19, nurse: 87, other: 23). There were no significant differences among clinician groups (nurse, physician, other). There was a high degree of acceptable perception of teamwork with a majority of staff (89-100%) across all sites having mean scores greater than 3 for all subscales. We also established good to excellent internal consistency and reliability for all scales (Cronbach's alpha: .85-92).

This data has been submitted in abstract form and is awaiting a response.

TASK FOUR. *Review and update the Phases of Illness Paradigm (POIP) checklists and assess the time it takes for new checklist items to be reliably completed without new/additional education for the healthcare team.*

The core site began piloting the tools in August 2014 with implementation in October 2014. Mid-point assessment and changes are currently ongoing (March 2015) with proposed implementation by May 2015. Serial interviews (Individual and group) and satisfaction surveys are in analysis with preliminary findings at this site described below.

1. Clinicians decided that the process to use the tools would be as follows: during change of shift (COS) the off going and on coming bedside nurse would complete the scales tool together. First, the conditional assessment section would be completed by placing exes or lines along the continuum based upon the nurse's opinions. From that data, the nurse makes a SOI judgment and places a mark along the continuum. Then, the nurse continues to make marks along each continuum in the treatment section reflecting the patient's current treatments. Lastly, the nurse transfers the SOI mark to the Team View SOI scale so that the assessment can be readily available for all users.
2. Additional areas for nurses to take notes added to the scales tool.
3. Additional areas on the Team View are needed to leave messages, an area to notate problems, and note allergies.
4. Checkboxes to track bundles were removed from the Team View and added to an SBAR (situation, background, assessment, recommendation).
5. The integration of the SBAR to the tools. The standard method of communication between providers is the SBAR. This language was added to the tools to reinforce tool use during handoffs and to display information about the patient that does not change, such as past medical history (See Appendix F).
6. A separate tool for a patient on extracorporeal membrane oxygenation (ECMO) was created to reflect the higher acuity and differences in their sickness level. The SOI scale goes from "could die, most sick" to "could decannulate." In addition, status tracking contains different elements than the standard Team View (See Appendix D).

The Houston site implemented their tools in March 2015 with mid-point assessment in September 2015. The Dallas site will pilot their tools by May 2015 with implementation to follow. We project that all sites will have tools implemented by May 2015.

D. Key Research Accomplishments

- Models of clinician perceptions of patient condition and progress through the Burn ICU are described at all three sites.
- Tools that aid clinical assessment of patient illness severity and that help identify important treatment priorities are implemented at 2 sites and nearing implementation at the third and final site.
- There are differences in how clinicians think demonstrated by the mental models elicited from the card sort data. There were differences among professions or clinician types, by years of experience, and among institutions. These differences are important to acknowledge as they likely impact communication, care coordination, and ultimately patient safety and outcomes.
- There are differences among professions or clinician types in workload perception, with statistical significance between:
 - Students and others for mental and overall effort.

- Physicians and others for overall workload.
 - Nurses and others for overall workload.
 - Physicians and others for temporal demand.
 - Nurses and others for temporal demand.
- Mental, temporal, performance and effort all contribute significantly more to the overall cognitive workload than physical or frustration subscales.
 - Teamwork perception at all three sites was perceived highly favorable.
 - The T-TPQ is a valid and reliable tool to measure teamwork perception in the burn ICU.

E. Conclusions

We were able to understand the work domain across three different Burn ICUs in terms of patient condition, patient progress, and dependent clinician treatment priorities to create ecologically valid tools that support clinician work and using the Phases of Illness Paradigm. We were able to implement the tools in two sites with the third due to start in the next reporting quarter. Validation of the Phases of Illness paradigm is ongoing with tool use and satisfaction across all three sites.

Preliminary qualitative data based on group interviews and feedback; demonstrate improvements in team communication of elements that are reported to be frequently missed on MDR or at change of shift. However, it is too early to report statistically significant improvements since pre-baseline data are the only set from across all sites that have been analyzed. The outcomes of this study should impact military medicine by improving communication, aligning condition and treatments thereby improving patient outcomes.

By the first quarter of the next reporting year of this project all sites will have implemented the tools developed for their sites. By the next annual report, retrospective research will be submitted and started, looking at the effects of tool use on clinician behaviors, costs of care, and patient outcomes. The repeated measures design of this original study will show the impact of instituting these tools using a mixed methods approach.

F. Publications, Abstracts, And Presentations

Presented Abstracts

1. Pamplin, J.C., Murray, S.J., Chung, K., Mann-Salinas, E.A. & Nemeth, C. **Card Sorts Help “Unpack” Clinician Perspectives on Patient Condition and Treatment Priorities.** Presented at the Military Health System Research Symposium, 18-21 August 2014, Ft. Lauderdale, FL. & at the Society of Critical Care Medicine Annual Congress, 17-21 January 2014, Phoenix, AZ.
2. Murray, S.J., Chung, K., Mann-Salinas, E.A., & Caldwell, N. **Developing Cognitive Aides according to the Phases of Illness Paradigm for use in the Burn ICU.** Presented at the Military Health System Research Symposium, 18-21 August 2014, Ft. Lauderdale, FL.

**manuscripts in preparation for #1

Accepted Abstracts for Presentation

- i. Sarah Murray, Maria Serio-Melvin, Jay K. Aden, Elizabeth Mann-Salinas, Kevin K. Chung, Todd Huzar, Steven Wolf, MD, Christopher Nemeth, and Jeremy C. Pamplin. **Comparing the workload perceptions of determining patient condition and priorities of care between burn providers in three burn ICUs.** Accepted for presentation at the American Burn Association, Chicago, IL April 2015

- ii. Jeremy C. Pamplin, Sarah Murray, Maria Serio-Melvin, Jay K. Aden, Elizabeth Mann-Salinas, Kevin K. Chung, Todd Huzar, Steven Wolf, MD, Christopher Nemeth.
Discovering mental models that burn ICU clinicians' use for decision making using card sorts. Accepted for presentation at the American Burn Association, Chicago, IL April 2015

G. Inventions, Patents And Licenses

Not applicable.

H. Reportable Outcomes

1. The Core Site has described how clinicians perceive patient condition and progress through the ICU. These perspectives have been organized into a “scales tool” and a “bedside checklist tool.” The final implemented tools and the Core Site in-service are included in appendices B and C respectively. These tools and their development were presented in abstract form at the Military Health System Research Symposium, Ft. Lauderdale, FL, 18-21 August 2014 (see appendix G) and presented nationally at the Society of Critical Care Medicine Annual Congress, 17-21 January 2014, Phoenix, AZ.
2. Using data collected from the Core and Houston Sites, the project has identified significant differences in the mental models that clinicians use to prioritize information related to patient condition and treatments. Physicians, nurses, physician trainees, respiratory therapists, nutritionists, and clinicians of different experience levels prioritize information and treatment options differently. These results have been accepted for presentation at the American Burn Association Annual Conference, 21-24 April 2015, Chicago, IL (see appendix H).
3. We have also analyzed the NASA-TLX data from all three participating sites and have described the cognitive workload that clinicians perceive while performing the tasks of identifying patient condition and treatment priorities during multidisciplinary rounds. Clinicians of different experience levels and of different professional backgrounds perceive their workload differently. Decreasing this workload may free cognitive processes to focus on more important decisions. These results will be presented to the American Burn Association Annual Conference, 21-24 April 2015, Chicago, IL (see appendix H).
4. These mental models have been used at all three sites and have validated the “scales” and “checklist” (now called “Team View”) tools through focus group interviews. The tools have been produced for use at the Core Site (see appendices A & B) and have undergone unit level review implementation in Houston, and are undergoing unit level review in Dallas.

I. Other Achievements

Nothing to report.

J. Future plans and funding options.

The data collected in this project represent models of information use and decision making within the burn ICU. Many of these lessons learned can likely be applied to other patient care domains. For example, the differences in the way clinicians of different types use information and prioritize decision making suggest that tools that are optimally developed to support their work should vary according to these differences. In other words, tools should ideally account for a clinician's professional background and experience level and they should vary according to institution and by patient condition. An example of this type of tool might be an information display that changes according to patient condition, the clinician using it, and by the location of its use.

Validating the scales tools by patient outcome could also prove to be a more accurate prognostic scoring system than those currently used by burn ICUs. Future development of these tools using computer modeling and or computer display could significantly improve their utility, provide a means to increase their fidelity in different clinical circumstances, and could increase early recognition of changes in patient condition. This final aspect of tool development could warn clinicians about impending decline in patient condition (e.g. impending sepsis) and indicate the need to take action before the patient clinically deteriorates.

If additional funding options were available, pursuing these options could easily be supported at the core and/or participating sites.

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APPENDIX A. Goals, Objectives, and Tasks Preliminary Codes

See Next 9 Pages

tblCodes Query	
Code	Expr1
Goal: "Comfort"	Goal
Goal: "Get Stable"	Goal
Goal: Acceptable electrolyte concentrations	Goal
Goal: Achieve Proper Positioning	Goal
Goal: Adequate Cardiac Output	Goal
Goal: Adequate Hydration	Goal
Goal: Adequate Nutrition	Goal
Goal: Adequate Oxygenation	Goal
Goal: Adequate Oxygenation and ventilation	Goal
Goal: Adequate Pain Control	Goal
Goal: Adequate Pain Control with intact neurological integrity	Goal
Goal: Adequate pH	Goal
Goal: Adequate Sedation	Goal
Goal: Adequate Sleep	Goal
Goal: Adequate Tissue Perfusion	Goal
Goal: Adequate urine output	Goal
Goal: Adequate Ventilation	Goal
Goal: Awake, Interactive, and/or Participatory Patient	Goal
Goal: Balance activity and rest	Goal
Goal: Continence of bowel and bladder	Goal
Goal: Continue to Improve	Goal
Goal: Correct coagulopathy	Goal
Goal: Decrease metabolic demand	Goal
Goal: Discharge to home	Goal
Goal: Establish code status	Goal
Goal: Establish goals of care	Goal
Goal: Establish Home Program to Main Functionality	Goal
Goal: Euthermia	Goal
Goal: Fluid Management	Goal
Goal: Functional Use of Upper and/or Lower Extremities	Goal
Goal: Hemodynamic stability	Goal
Goal: Hemostasis	Goal
Goal: Identify Cause of Infection	Goal
Goal: Identify Goals of Care	Goal
Goal: Improve Hemodynamics	Goal
Goal: Improve or Maintain Quality of Life	Goal
Goal: Improve skin integrity	Goal
Goal: Improved Renal Function	Goal
Goal: Improving Lung Function	Goal
Goal: Improving or Maintaining Lung Function	Goal
Goal: Increase urine output	Goal
Goal: Independent ADLs	Goal
Goal: Independent Breathing	Goal
Goal: Keep patient/family informed	Goal
Goal: Maintain hemodynamic stability	Goal
Goal: Maintain homeostasis	Goal
Goal: Maintain Intact Neurologic Integrity	Goal
Goal: Maintain intact skin	Goal
Goal: Maintain lean body mass	Goal
Goal: Maintain Normal Blood Glucose	Goal
Goal: Maintain Normal blood pressure	Goal
Goal: Maintain Normal Labs	Goal
Goal: Maintain or Improve Functionality	Goal
Goal: Maintain or Improve Lung Function	Goal

tblCodes Query	
Code	Expr1
Goal: Mitigate inflammatory process	Goal
Goal: Monitor for Infection	Goal
Goal: Normal Heart Rhythm	Goal
Goal: Normal Plasma Sodium Concentration	Goal
Goal: Optimal Wound Healing	Goal
Goal: Organ Suppoprt with Hemodialysis	Goal
Goal: Organ Support	Goal
Goal: Organ support (renal)	Goal
Goal: Organ Support with Mechanical ventilation	Goal
Goal: Organ Support with RRT	Goal
Goal: Participation in therapy	Goal
Goal: Prevent Complication or Harm	Goal
Goal: Prevent Complication or Harm (infection)	Goal
Goal: Prevent Complication or Harm (skin breakdown)	Goal
Goal: Promote GI motility	Goal
Goal: Protect or Maintain Airway	Goal
Goal: Reduce Edema	Goal
Goal: Rest	Goal
Goal: Restore normal heart rhythm	Goal
Goal: Restore Renal Function	Goal
Goal: Tolerate Surgery	Goal
Goal: Treat infection	Goal
Goal: Unable to code	Goal
Objective: Achieve Adequate Bowel Function	Obje
Objective: Achieve Adequate Pain Control	Obje
Objective: Achieve Adequate Sedation	Obje
Objective: Achieve Fluid	Obje
Objective: Achieve Normothermia	Obje
Objective: adequate hydration	Obje
Objective: Adequate post-operative resuscitation	Obje
Objective: Adequate ventilation to achieve target pH	Obje
Objective: Admit patient to unit	Obje
Objective: Assess wounds	Obje
Objective: Balance blood draws, loss and products to manage blood levels	Obje
Objective: Breathing Trial	Obje
Objective: Bronchoscopy for some reason	Obje
Objective: Change ventilator mode	Obje
Objective: Complete metabolic study	Obje
Objective: Consultation with another service to evaluate treatment option	Obje
Objective: Continuous IV pain medication	Obje
Objective: control blood pressure	Obje
Objective: Coordinate Discharge or Transfer	Obje
Objective: Coordinate specified imaging	Obje
Objective: Correct Electrolyte disruption	Obje
Objective: Daily Sedation Holiday	Obje
Objective: Decrease abdominal pressure	Obje
Objective: Diagnose a problem	Obje
Objective: Diurese patient	Obje
Objective: Edema management to prevent joint contractures	Obje
Objective: Effective CPR	Obje
Objective: Engage patient in meaningful activity to improve/maintain quality of life	Obje
Objective: ensure patient is stable for surgery	Obje
Objective: Ensure rest overnight, increase vent settings	Obje
Objective: Euthermia during wound care	Obje

tblCodes Query	
Code	Expr1
Objective: Evaluate abnormal exam finding	Obje
Objective: Evaluate laboratory abnormality	Obje
Objective: Family Education	Obje
Objective: Fluid resuscitation	Obje
Objective: Follow Drug Levels	Obje
Objective: Give medications to achieve adequate sleep	Obje
Objective: Glucose control	Obje
Objective: Identify Etiology of Leukocytosis	Obje
Objective: Improve oxygenation and ventilation	Obje
Objective: Improve patient communication	Obje
Objective: Intermittent CRRT	Obje
Objective: Intubate and bronchoscopy	Obje
Objective: IV pain medications	Obje
Objective: Maintain adequate anticoagulation	Obje
Objective: Maintain adequate cardiac output	Obje
Objective: Maintain Adequate MAP	Obje
Objective: Maintain Adequate Nutrition	Obje
Objective: Maintain Adequate Oxygenation	Obje
Objective: Maintain Adequate UOP	Obje
Objective: Maintain Adequate Volume Status	Obje
Objective: Maintain or Improve Condition	Obje
Objective: Maintain oral health by using VAP precautions	Obje
Objective: Maintain proper blood pressure with beta blocks and pain medications	Obje
Objective: Maintain safety during physical activities	Obje
Objective: Maintain skin integrity with proper wound care	Obje
Objective: Minimal but Adequate Supplemental Oxygen	Obje
Objective: Monitor	Obje
Objective: Monitor cardiac events	Obje
Objective: Monitor cardiac output	Obje
Objective: Monitor electrolytes	Obje
Objective: Monitor for post-operative complications or bleeding	Obje
Objective: Monitor glucose control with fingerstick blood glucose	Obje
Objective: Monitor hemodynamic status	Obje
Objective: Monitor oxygenation	Obje
Objective: Monitor pulmonary status	Obje
Objective: Monitor renal function	Obje
Objective: Monitor Ventilation	Obje
Objective: Observe patient	Obje
Objective: Operate to Achieve a Goal	Obje
Objective: OR for Excision and Grafting	Obje
Objective: Organ Support	Obje
Objective: Perform bronchoscopy	Obje
Objective: perform proper wound care	Obje
Objective: Post operative recovery/management	Obje
Objective: Prepare for surgery	Obje
Objective: Prepare patient for hemodialysis	Obje
Objective: Prevent cardiac	Obje
Objective: Prevent cardiac ischemia	Obje
Objective: Prevent Infection	Obje
Objective: Prevent respiratory distress	Obje
Objective: Progressive Mobility and Physical Activity	Obje
Objective: proper dressing care	Obje
Objective: Proper Positioning	Obje
Objective: proper wound and skin care	Obje

tblCodes Query	
Code	Expr1
Objective: Protect Airway	Obje
Objective: Pulmonary Rehab	Obje
Objective: Pulmonary toilet while intubated	Obje
Objective: reduce hypertension	Obje
Objective: Reduce IV pain medication while still providing adequate pain control	Obje
Objective: Reduce pulmonary edema	Obje
Objective: reduce scarring by improving skin integrity	Obje
Objective: reduce tachycardia	Obje
Objective: Replace Electrolytes	Obje
Objective: Replace free water deficit to correct sodium concentration	Obje
Objective: Resuscitate	Obje
Objective: Sedate to tolerate procedures and treatments	Obje
Objective: Sedate with specified medication minimizing hemodynamic changes	Obje
Objective: Start Nebulizers	Obje
Objective: Stimulate bowel movement with enema and abdominal massage	Obje
Objective: Tailor antibiotics for specific organism	Obje
Objective: Titrate pain medications	Obje
Objective: Tolerate mild hyperkalemia for daily dialysis	Obje
Objective: Transfer patient to floor	Obje
Objective: Transfer to appropriate level of or location for care	Obje
Objective: Treat hemodynamic instability with blood, fluids and/or pressors	Obje
Objective: Treat Infection	Obje
Objective: unable to code	Obje
Objective: Use coban for edema management to prevent joint contractures	Obje
Objective: Use CVVH for volume management or solute clearance	Obje
Objective: Use decision support for burn resuscitation	Obje
Objective: Use Mechanical Ventilation	Obje
Objective: Use specified ventilator mode and settings for inhalation injury	Obje
Objective: Ventilator Liberation by Some Process	Obje
Objective: Wound Care as specified	Obje
See goals	See
See Objectives	See
Task: Nurse: ETT Care	Task
Task: Nurse: Monitor Vitals	Task
task: Nurse: perform dressing change	task
Task: Nurse: Perform ETT Care	Task
Task: Nurse: Perform hourly urine output checks	Task
Task: Role?: "Rest treatment"	Task
Task: Burn Surg	Task
Task: Burn Surgeon: Excision of wounds in OR	Task
Task: Burn Surgeon: Graft placement in OR	Task
Task: Burn Surgeon: Perform escharotomy and/or fasciotomy if necessary	Task
Task: Family Member: Be present	Task
Task: Nurse and CRRT Nurse: achieve fluid goal	Task
Task: Nurse and CRRT Nurse: start CRRT	Task
Task: Nurse and wound care team: Use specified wound care product	Task
Task: Nurse and wound care team: perform wound care	Task
Task: Nurse and wound care team: shower, wound care and apply dressings	Task
Task: Nurse or RT: Change vent settings	Task
Task: Nurse: position patient to prevent skin breakdown	Task
Task: Nurse: Start specified feeding	Task
Task: Nurse: Administer colloid and crystalloid	Task
Task: Nurse: Administer specified fluids and/or blood products	Task
Task: Nurse: Administer specified fluids and/or blood products	Task

tblCodes Query	
Code	Expr1
Task: Nurse: Administer specified medication	Task
Task: Nurse: Administer specified sedation medication to specified RASS level	Task
Task: Nurse: Administer tube feeding at goal	Task
Task: Nurse: Assess and treat for hemodynamic instability post OR	Task
Task: Nurse: Assess and treat for hemodynamic instability psot OR	Task
Task: Nurse: assess EKG	Task
Task: Nurse: Assess EKG, notify resident of changes	Task
Task: Nurse: Assess electrolytes and replace if needed	Task
Task: Nurse: Assess extremities for adequate tissue perfusion	Task
Task: Nurse: Assess pain and intervene if necessary	Task
Task: Nurse: Assess post-operative status	Task
Task: Nurse: assess specified vital signs and intervene if necessary	Task
Task: Nurse: Assess tube feeding tolerance	Task
Task: Nurse: Assist with out of bed activity	Task
Task: Nurse: collaborate with interdisciplinary team	Task
Task: Nurse: collect and send specified lab tests	Task
Task: Nurse: Communicate to receiving institution	Task
Task: Nurse: Discontinue devices	Task
Task: Nurse: Document care	Task
Task: Nurse: Educate Patient	Task
Task: Nurse: Encourage specified oral fluid intake	Task
Task: Nurse: Follow electrolyte replacement protocol	Task
Task: Nurse: follow VAP bundle protocol	Task
Task: Nurse: give electrolytes per standing orders	Task
Task: Nurse: Give first dose of specified antibiotics	Task
Task: Nurse: give Medications	Task
Task: Nurse: Give specified fluids	Task
Task: Nurse: Give specified medication	Task
Task: Nurse: Give specified nutrition	Task
Task: Nurse: Maintain adequate MAP	Task
Task: Nurse: monitor EKG for changes	Task
Task: Nurse: monitor tolerance	Task
Task: Nurse: move patient to new bed	Task
Task: Nurse: Obtain specified cultures	Task
Task: Nurse: Obtain specified laboratory tests	Task
Task: Nurse: perform dressing change	Task
Task: Nurse: provide adequate pain management	Task
Task: Nurse: Start D5w @ 50ml/hr	Task
Task: Nurse: start trophic TF	Task
Task: Nurse: stop specified medication	Task
Task: Nurse: titrate infusion to urine output between 30-50mL per hour	Task
Task: Nurse: wean sedation	Task
Task: Occupational Therapist: position UE to reduce edema	Task
Task: Patient: Drink specified supplements and other fluids	Task
Task: Patient: Elevate bilateral upper and lower extremities	Task
Task: Patient: Mobilize OOB	Task
Task: Physican: Monitor gastic events	Task
Task: Physican:attend family meeting	Task
Task: Physican:examine wounds	Task
Task: Physician: Adjust medications	Task
Task: Physician: Assess and determine overall status	Task
Task: Physician: Assess and order specified nutrition	Task
Task: Physician: Assess and treat for hemodynamic instability post OR	Task
Task: Physician: Assess hemodynamic status	Task

tblCodes Query	
Code	Expr1
Task: Physician: Assess Sinuses	Task
Task: Physician: Assess wound healing	Task
Task: Physician: avoid changing TF unless hyperkalemia worsens	Task
Task: Physician: Collaborate with consulting service	Task
Task: Physician: Cover excised wounds with skin grafts in OR	Task
Task: Physician: Determine disposition	Task
Task: Physician: Discharge patient	Task
Task: Physician: Evaluate gall bladder for cholecystitis	Task
Task: Physician: Excision of wounds in OR	Task
Task: Physician: Follow up on results of test	Task
Task: Physician: Lead rounds	Task
Task: Physician: Lead team on plan for rehab and weaning process	Task
Task: Physician: Order specified electrolyte replacement	Task
Task: Physician: Order specified feeding	Task
Task: Physician: Order specified fluids for resuscitation	Task
Task: Physician: Order specified medication	Task
Task: Physician: Order specified medicaton	Task
Task: Physician: Order specified wound dressing	Task
Task: Physician: perform bronchoscopy	Task
Task: Physician: place appropriate intravenous lines	Task
Task: Physician: review cultures or lab test results	Task
Task: Physician: schedule patient for operating room	Task
Task: Physician: stop specified medication	Task
Task: Physician: supervise procedure	Task
Task: Rehab: Ambulate patient	Task
Task: Rehab: Assess ADLs performed by patient	Task
Task: Rehab: Assess and assist with ambulation and transfers	Task
Task: Rehab: Assess physical and rehabilitation status	Task
Task: Rehab: Assess positioning and device placement	Task
Task: Rehab: Teach patient home exercise, compression and safety plan	Task
Task: Rehab: Tilt patient	Task
Task: Rehab: Use coban for edema management	Task
Task: Resident: Change vent settings	Task
Task: Resident: consult with social work to find out what patient needs for discharge	Task
Task: Resident: order D5W @ 50ml/hr	Task
Task: Resident: order laboratory evaluation to make a diagnosis	Task
Task: Resident: Order Phos	Task
Task: Resident: order specified laboratory evaluation to make a diagnosis	Task
Task: Resident: order specified medication	Task
Task: Resident: order trophic TF	Task
Task: Resident: Start antibiotics	Task
Task: Resident: Start specificed antibiotics	Task
Task: Residtent: Order Phos	Task
Task: Respiratory Therapist: Administer specified nebulizer treatment	Task
Task: Respiratory Therapist: change trach to Passe Muir valve	Task
Task: Respiratory Therapist: decrease pressure support	Task
Task: Respiratory Therapist: Drop and Stretch	Task
Task: Respiratory Therapist: Perform pulmonary Toilet	Task
Task: Respiratory Therapist: Pursed lip breathing and Abdominal breathing	Task
Task: Respiratory Therapist: Pursed lip breathing/Abdominal breathing	Task
Task: Respiratory Therapist: Reduce FiO2	Task
Task: Respiratory Therapist: Vest Therapy (CPT)	Task
Task: Respiratory Therapist: wean FiO2	Task
Task: RN and MD: Monitor specified electrolyte	Task

tblCodes Query	
Code	Expr1
Task: RN: Give specified electrolyte	Task
Task: Role?: assess labs	Task
Task: Role?: Document care	Task
Task: Role?: Discuss care plan in interdisciplinary rounds	Task
Task: Role?: Active Range of Motion for Extremity Function	Task
Task: Role?: Administer humidified air via ventilator	Task
Task: Role?: Ambulation for specified distance	Task
Task: Role?: Assess abdominal exam	Task
Task: Role?: Assess and treat bleeding	Task
Task: Role?: assess fluid status	Task
Task: Role?: BAL	Task
Task: Role?: Change antibiotics	Task
Task: Role?: Edge of Bed Sitting for specified time	Task
Task: Role?: Examine wounds today	Task
Task: Role?: f/u labs	Task
Task: Role?: Follow blood gases	Task
Task: Role?: ID Consult regarding antibiotic recommendations	Task
Task: Role?: increase protein content of TF	Task
Task: Role?: Isometric Leg Exercises	Task
Task: Role?: mobilize patient	Task
Task: Role?: Monitor gastric residulals	Task
Task: Role?: Monitor oxygen saturations	Task
Task: Role?: Monitor pulses in extremities that are circumferentially burned and intervene if necessary	Task
Task: Role?: Monitor specified resuscitation parameters, MAP, UOP, Lactates	Task
Task: Role?: Monitor tolerance of an activity	Task
Task: Role?: Obtain blood gases	Task
Task: Role?: obtain cultures	Task
Task: Role?: Passive Range of Motion for Extremity Function	Task
Task: Role?: Perform BAL	Task
Task: Role?: perform bronchoscopy for pulmonary toilet	Task
Task: Role?: Perform Bronchoscopy with BAL	Task
Task: Role?: position patient to prevent skin breakdown	Task
Task: Role?: Protect airway, use bite block or other means	Task
Task: Role?: pulmonary toilet and cardiac chair position	Task
Task: Role?: Range of Motion for Extremity Function for a specified number of repetitions	Task
Task: Role?: Review diagnostic imagery (CXR)	Task
Task: Role?: Safe contact-guard during mobility	Task
Task: Role?: Secure ETT, document	Task
Task: Role?: Set appropriate vent settings	Task
Task: Role?: Sitting in TLC	Task
Task: Role?: Start broad-spectrum antibiotics	Task
Task: Role?: suction secretions	Task
Task: Role?: Tilt Table for Physical Activity	Task
Task: Role?: Tilt Table for Pulmonary Rehab	Task
Task: Role?: Tilt Table for weightbearing	Task
Task: Role?: Tilt Table for weightbearing for a specified time	Task
Task: Role?: transfer to 4E	Task
Task: Role?: Use coban for edema management	Task
Task: Role?:Perform Edge of Bed Sitting	Task
Task: RT: Perform Trach Collar Trial	Task
Task: Social Work: coordinate discharge	Task
Task: Unable to code	Task
Task:Dietician:Adjust TF to provide adequate nutrition	Task
Task:Dietician:Analyze metabolic study	Task

tblCodes Query	
Code	Expr1
Task:Dietician:Assess volume of TF delivered in last 24-48 hours	Task
Task:Dietician:Claiify when TFs are to be held with bedside nurse	Task
Task:Dietician:Confirm height and weight for nutrition estimations	Task
Task:Dietician:discuss TF hold parameters with bedside nurse	Task
Task:Dietician:Document volume of TF delivered	Task
Task:Dietician:Interpret metabolic study	Task
Task:Dietician:monitor calorie and protein deficit	Task
Task:Dietician:Monitor metabolic tolerance of overfeeding	Task
Task:Dietician:Monitor TF volume	Task
Task:Dietician:Order metabolic study	Task
Task:Nask:Daily Dressing Changes	Task
Task:Nurse: perform hourly urine output checks	Task
Task:Nurse:administer additional protein packets	Task
Task:Nurse:administer beta blocker	Task
Task:Nurse:Administer enema	Task
Task:Nurse:Administer Lasix IVPx3	Task
Task:Nurse:assess pain control	Task
Task:Nurse:begin enteral feeding	Task
Task:Nurse:check gastric residuals every 4 hours	Task
Task:Nurse:Check gastric residuals	Task
Task:Nurse:check labs q6 hours	Task
Task:Nurse:Clean face and ears before surgery	Task
Task:Nurse:collaborate with respiratory to perform SBT	Task
Task:Nurse:Communicate changes in vitals to MD	Task
Task:Nurse:complete sedation holiday	Task
Task:Nurse:continous assessment of glucose control	Task
Task:Nurse:Continue fluids as specified rate	Task
Task:Nurse:continue with CVVH	Task
Task:Nurse:daily dressing changes	Task
Task:Nurse:Dressing change	Task
Task:Nurse:ensure tube feedings continued	Task
Task:Nurse:Facilitate family meeting	Task
Task:Nurse:Glucose control	Task
Task:Nurse:Maintain MAP greater than 60	Task
Task:Nurse:Maintain urine output above 30cc/hr	Task
Task:Nurse:monitor fluids status	Task
Task:Nurse:Monitor hemodynamics	Task
Task:Nurse:monitor labs and vitals signs q1	Task
Task:Nurse:Monitor MAP and vital signs	Task
Task:Nurse:Monitor MAP continuously	Task
Task:Nurse:monitor renal labs	Task
Task:Nurse:Monitor respiratory status q3	Task
Task:Nurse:monitor urine output	Task
Task:Nurse:Monitor Ventilator Status	Task
Task:Nurse:Monitor Vitals	Task
Task:Nurse:Notify MD of any changes	Task
Task:Nurse:page physician once family arrives for meeting	Task
Task:Nurse:pain assessment q hour	Task
Task:Nurse:pain assessment with adjustment of narcotic infusions	Task
Task:Nurse:Perform abdominal massage	Task
Task:Nurse:perform bladder scan	Task
Task:Nurse:perform dressing change	Task
Task:Nurse:perform hourly blood glucose checks. Notify MD of critical results	Task
Task:Nurse:perform neurovascular checks hourly	Task

tblCodes Query	
Code	Expr1
Task:Nurse:perform sedation holiday	Task
Task:Nurse:perform wound care	Task
Task:Nurse:Prep patient for OR	Task
Task:Nurse:Reasses blood gases	Task
Task:Nurse:Titrate narcotics	Task
Task:Nurse:update family	Task
Task:Nurse:wean sedation	Task
Task:Occupational Therapist:perform stretching of UE	Task
Task:Occupational Therapist:provide family education	Task
task:PA:Have family meeting	task
Task:Resident: Order lasix	Task
Task:Resident:adjust medications	Task
Task:Resident:attend family meeting	Task
Task:Resident:Follow up on imaging	Task
Task:Resident:Monitor fluid status	Task
Task:Resident:Monitor labs	Task
Task:Resident:Monitor postoperative progress	Task
Task:Resident:Monitor pulmonary status	Task
Task:Role?: Adjust feeds and free water flushes	Task
Task:Role?: Follow up on culture results and adjust antibiotics	Task
Task:Role?: Recheck lab	Task
Task:Role?: suction with 100% O2	Task
Task:Role?:administer anti-diarrheal	Task
Task:Role?:administer diuretics	Task
Task:Role?:Administer insulin	Task
Task:Role?:Check GRV q4h	Task
Task:Role?:Continue TF	Task
Task:Role?:Dressing Change	Task
Task:Role?:ECG Q1	Task
Task:Role?:Follow Drug Levels	Task
Task:Role?:frequent suctionion	Task
Task:Role?:Initiate Dialysis	Task
Task:Role?:Initiate vasopressors for MAPs less than 60mmHg	Task
Task:Role?:Manually disimpact bowels	Task
Task:Role?:Monitor hemodynamics	Task
Task:Role?:Monitor Pressures, give fluid and pressors to maintain proper pressures	Task
Task:Role?:Monitor stool output	Task
Task:Role?:Monitor ventilator settings	Task
Task:Role?:Reasses bowl regiment daily	Task
Task:Role?:Reinsert Quentin catheter	Task
Task:Role?:titrate fluids down	Task
Task:RT:Adminster IPV for respiratory toilet	Task
Task:RT:Adminster NEB treatment	Task
Task:RT:Ensure ventilator is working correctly	Task
Task:RT:Evaluate ABG	Task
Task:RT:VEP and secretion clearance therapies	Task

APPENDIX B. Card Sort Examples

See Next Page

Sickest Patient/Could Die today ISOI 10)

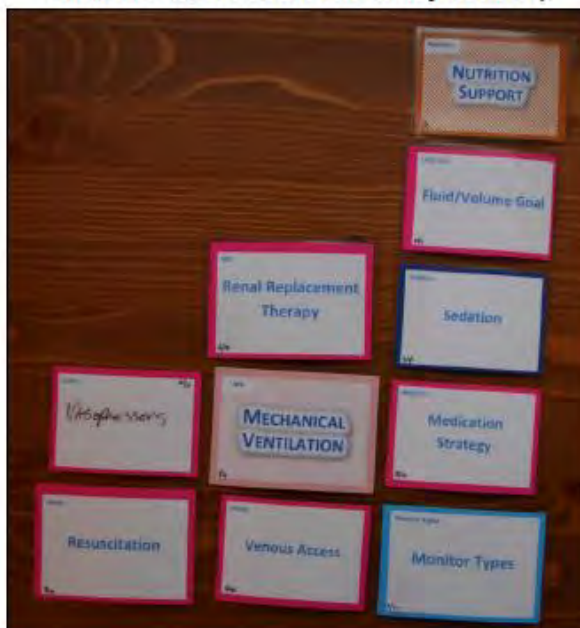


Least Sick Patient/Could Transfer (SOI 1)



Figure 1: Feature Card Sort; left: most sick, right: least sick

Sickest Patient/Could Die today ISOI 10)



Least Sick Patient/Could Transfer (SOI 1)



Figure 2: Feature Card Sort; left: most sick, right: least sick

APPENDIX C. Scales Tools

USAISR Original

USAISR – Proposed Update

Dallas – Proposed

Houston

See Next 4 Pages

[illegible]

Tool 2. Patient’s CURRENT Treatments

Make an “X” according to the patient’s **current** treatments. **MAKE NOTES WHERE NECESSARY.**

Severity of Illness

Neuro	Analgesia & Sedation		Intubated Patients Only		Intubated and Non-Intubated Patients	
			Deep Sedation +/-Paralyzed Non-Responsive	Moderate Sedation (RASS -1 to -3) Arousable (opens eyes, withdraws)	Light Sedation (RASS 0 to -1) Interactive (follows commands)	No Sedation (RASS 0) Participatory (expresses self)
			<input type="checkbox"/> minimize oxygen demand	<input type="checkbox"/> patient ventilator synchrony	<input type="checkbox"/> prevent patient harm	<input type="checkbox"/> maximize patient engagement & participation in care
			<input type="checkbox"/> maximize perfusion	<input type="checkbox"/> prevent agitated movements	<input type="checkbox"/> engage patient in care	<input type="checkbox"/> maximize rehabilitation
			<input type="checkbox"/> protect grafts	<input type="checkbox"/> protect grafts, tube/line/device	<input type="checkbox"/> more physical/occupational therapy	<input type="checkbox"/> Scheduled IV or Enteral or PO + PRN Enteral > IV

Notes:

Delirium	Prevention	<input type="checkbox"/> Day-Night Light Cycle	<input type="checkbox"/> Day-Night Light Cycle <input type="checkbox"/> Un-Interrupted Sleep, 4-6 hrs <input type="checkbox"/> Physical activity <input type="checkbox"/> Consider ear plugs	<input type="checkbox"/> Day-Night Light Cycle <input type="checkbox"/> Sleep, 4-8 hrs <input type="checkbox"/> Increase mobility <input type="checkbox"/> Consider ear plugs, sleep aid <input type="checkbox"/> Haloperidol IV Push <input type="checkbox"/> Quetiapine PO/Enteral
	Treatment	<input type="checkbox"/> NA	<input type="checkbox"/> Dexmedetomidine drip <input type="checkbox"/> Haloperidol IV Push	

Notes:

CV	Monitoring Standard monitoring (Tele, SpO2, RR, NBP)	Maximize knowledge Standard ICU Plus: Trend: <input type="checkbox"/> Abdominal Pressures <input type="checkbox"/> TTE/IVC size	<input type="checkbox"/> Continuous CO/SVV/SVR	Assure effective Ventilation & Sedation Standard ICU Plus: <input type="checkbox"/> Foley <input type="checkbox"/> EtCO2 <input type="checkbox"/> A-Line <input type="checkbox"/> ±CVP	Ward Compatible <input type="checkbox"/> Standard ICU Consider: <input type="checkbox"/> Decrease NBP measurements overnight <input type="checkbox"/> Remove Foley

Notes:

Pulm	Mechanical Ventilation	<input type="checkbox"/> Paralysis	<input type="checkbox"/> VDR Protocol <input type="checkbox"/> PCV Protocol <input type="checkbox"/> ARDS Algorithm	<input type="checkbox"/> APRV Protocol <input type="checkbox"/> Oscillatory/Demand CPAP protocol <input type="checkbox"/> CPAP/PSV Protocol <input type="checkbox"/> Daily breathing trials and/or wean	<input type="checkbox"/> CPAP/CPAP-PS Protocol <input type="checkbox"/> Trach collar/speaking valve <input type="checkbox"/> NA, not on mechanical ventilation

Notes:

GI	Nutrition	<input type="checkbox"/> Holding Enteral Feeds <input type="checkbox"/> Consider TPN	<input type="checkbox"/> Goal = full enteral support <input type="checkbox"/> If unable to achieve, use TPN	<input type="checkbox"/> Goal is transition to PO solids and supplements

Notes:

Renal/Endo/Heme/ID	Labs	Q4-Q6: <input type="checkbox"/> ABG <input type="checkbox"/> VBG/SvO2 <input type="checkbox"/> Lactate <input type="checkbox"/> CBC <input type="checkbox"/> Chem Consider: <input type="checkbox"/> TEG <input type="checkbox"/> Coags <input type="checkbox"/> Fibrinogen Q12-24: <input type="checkbox"/> LFT <input type="checkbox"/> Drug Levels <input type="checkbox"/> Pedi Tubes	Q8-Q24: <input type="checkbox"/> ABG <input type="checkbox"/> CBC <input type="checkbox"/> Chem <input type="checkbox"/> LFT <input type="checkbox"/> Coags Consider: <input type="checkbox"/> Drug Levels	Q24-QOD: <input type="checkbox"/> CBC <input type="checkbox"/> Chem <input type="checkbox"/> Qweek: <input type="checkbox"/> LFT <input type="checkbox"/> Coags Consider: <input type="checkbox"/> Drug Levels <input type="checkbox"/> PRN Labs only

Notes:

MSK/Wounds	Rehabilitation	None or As Able <input type="checkbox"/> None or <input type="checkbox"/> ROM/Positioning Q2hrs <input type="checkbox"/> Splinting	As Tolerated to Maintain or Improve Function <input type="checkbox"/> General Progression: ROM → <input type="checkbox"/> Bed-to-Chair Position/Cardiac Chair → <input type="checkbox"/> Danlge/Tilt/Stand <input type="checkbox"/> Splinting	Improve Function <input type="checkbox"/> to March/Walk → <input type="checkbox"/> Go Outside! <input type="checkbox"/> Splinting

Notes:

If all checks are not aligned with the the patient’s SOI, page the resident or attending physician to disucss.

	NA	Good	Discuss		NA	Good	Discuss
GI Prophylaxis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Respiratory orders current	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
DVT Prophylaxis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Wound care order current	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
CHG Prophylaxis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Family has questions	<input type="checkbox"/>		<input type="checkbox"/>
HOB > 30 degrees	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Delirium Positive	<input type="checkbox"/>		<input type="checkbox"/>
Last BM < 48 hrs ago	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Restraints	<input type="checkbox"/>		<input type="checkbox"/>

Tool 1. Patient's Current Condition

Please make a noticeable "X" ANYWHERE on ANY of the scales below that indicates your estimate of the patient's condition right now. Then go on to the next page.

[illegible]

Dallas Proposed Treatment Tool Option 1

Tool 2. Patient's Current Treatments

Make a noticeable "X" ANYWHERE the scales below that indicates the patient's current treatments.

Text in each section is organized by objective/goal in bold type, recommendations in regular type, and considerations in italic type.

[illegible]

Dallas Proposed Treatment Tool Option 2

		Yes/NA	No/Discuss
Analgesia & Sedation	Is the patient interactive/participatory in their care?	<input type="checkbox"/>	<input type="checkbox"/>
	Is the patient awake and participatory in their care? If not, how might you get them so?	<input type="checkbox"/>	<input type="checkbox"/>
	Does the patient have minimal pain?	<input type="checkbox"/>	<input type="checkbox"/>
	Is pain controlled per the patient?	<input type="checkbox"/>	<input type="checkbox"/>
	Is the patient primarily on PO/Enteral pain meds with supplemental IV PRN meds?	<input type="checkbox"/>	<input type="checkbox"/>
	Is the patient on NO sedation?	<input type="checkbox"/>	<input type="checkbox"/>
Mechanical Ventilation	Is the patient off the ventilator?	<input type="checkbox"/>	<input type="checkbox"/>
	If not off the ventilator, does the patient need a tracheostomy?	<input type="checkbox"/>	<input type="checkbox"/>
	If the patient is not off the ventilator, did he/she receive a breathing trial today?	<input type="checkbox"/>	<input type="checkbox"/>
	If not off the ventilator, is the patient on CPAP and/or did he/she receive a breathing trial or trach collar trial?	<input type="checkbox"/>	<input type="checkbox"/>
	What O2 Concentration/Support if applicable?	<input type="checkbox"/>	<input type="checkbox"/>
Labs	Is the frequency of all labs daily or none?	<input type="checkbox"/>	<input type="checkbox"/>
Monitoring	Is the patient on no more than standard ICU monitoring (Telemetry, SpO2, Foley)?	<input type="checkbox"/>	<input type="checkbox"/>
	Can you reduce NBP measurements overnight?	<input type="checkbox"/>	<input type="checkbox"/>
	Can you remove the Foley?	<input type="checkbox"/>	<input type="checkbox"/>
Sleep	Is the patient on schedule to maintain circadian rhythm (Day/Night Cycle)?	<input type="checkbox"/>	<input type="checkbox"/>
	Does he/she need a Sleep Aid?	<input type="checkbox"/>	<input type="checkbox"/>
	How long did this patient sleep?	<input type="checkbox"/>	<input type="checkbox"/>
Rehabilitation	Is the patient able to sit and/or stand at the bedside?	<input type="checkbox"/>	<input type="checkbox"/>
	Can you advance the patient's rehab goal to marching, walking, and possibly going to the gym or outside?	<input type="checkbox"/>	<input type="checkbox"/>
Nutrition	If not on a PO diet, is he/she on full enteral feeds?	<input type="checkbox"/>	<input type="checkbox"/>
	What is the diet?	<input type="checkbox"/>	<input type="checkbox"/>
Medications	Is the patient on PO meds only and possibly some enteral or IV PRN meds?	<input type="checkbox"/>	<input type="checkbox"/>
Transition	Is this patient ready to transfer to the ward?	<input type="checkbox"/>	<input type="checkbox"/>
	What needs to be done for the patient in order to transfer him/her to the ward?	<input type="checkbox"/>	<input type="checkbox"/>

Dallas Proposed Treatment Tool Option 2

		Yes/NA	No/Discuss
Analgesia & Sedation	Has the goal of sedation been defined? Arousable or more awake?	<input type="checkbox"/>	<input type="checkbox"/>
	If appropriate, limit sedation to promote ventilator weaning.	<input type="checkbox"/>	<input type="checkbox"/>
	Use APRV, CPAP, or normal tidal volume ventilation if decreasing ventilator support.	<input type="checkbox"/>	<input type="checkbox"/>
	Use volume or pressure control ventilation if the patient is not weaning or is getting worse.	<input type="checkbox"/>	<input type="checkbox"/>
	Consider a daily breathing trial.	<input type="checkbox"/>	<input type="checkbox"/>
	Did the patient receive a daily breathing trial or is one scheduled for today?	<input type="checkbox"/>	<input type="checkbox"/>
Labs	Daily labs.	<input type="checkbox"/>	<input type="checkbox"/>
	Is the patient on the correct/best lab frequency? (Q12-24 ABG, CBC, Chem; Q24-QWeek LFT, Coag)	<input type="checkbox"/>	<input type="checkbox"/>
Monitoring	Is the patient on at least standard ICU monitoring only (Telemetry, SpO2, Foley)?	<input type="checkbox"/>	<input type="checkbox"/>
	Routine ICU Monitoring (A-Line, EtCO2, Telemetry, SpO2, RR, NBP, +/- CVP)	<input type="checkbox"/>	<input type="checkbox"/>
Sleep	Is there a schedule to maintain day/night cycles?	<input type="checkbox"/>	<input type="checkbox"/>
	How long did the patient sleep last night?	<input type="checkbox"/>	<input type="checkbox"/>
Rehabilitation	Is the patient “tilting” or going to cardiac chair?	<input type="checkbox"/>	<input type="checkbox"/>
	<i>Consider sitting at bedside.</i>	<input type="checkbox"/>	<input type="checkbox"/>
	<i>Consider standing/marching/or walking if able.</i>	<input type="checkbox"/>	<input type="checkbox"/>
	<i>Consider standing or walking if able.</i>	<input type="checkbox"/>	<input type="checkbox"/>
Nutrition	Is the patient achieving “full support” (100% of caloric and protein goals) via enteral route?	<input type="checkbox"/>	<input type="checkbox"/>
	If unable to achieve “full support”, <i>consider TPN.</i>	<input type="checkbox"/>	<input type="checkbox"/>
Medications	Is the patient receiving mostly IV or Enteral plus IV PRN medications?	<input type="checkbox"/>	<input type="checkbox"/>


Dallas Proposed Treatment Tool Option 2

		Yes/NA	No/Discuss
Analgesia & Sedation	Is the patient on mostly continuous IV analgesia and sedation with additional IV PRN medication?	<input type="checkbox"/>	<input type="checkbox"/>
	Is the patient on enough sedation/analgesia to achieve ventilation/oxygenation goals?	<input type="checkbox"/>	<input type="checkbox"/>
	Is the patient on AC Pressure Control with low tidal volumes or the VDR?	<input type="checkbox"/>	<input type="checkbox"/>
Labs	Is the patient on the correct/best lab frequency? (4-6 ABG, VBG/ScvO2, Lactate, CBC, Chem, Coags; Q12-24 LFT)	<input type="checkbox"/>	<input type="checkbox"/>
Monitoring	The patient should have continuous arterial blood pressure monitoring and continuous cardiac output monitoring.	<input type="checkbox"/>	<input type="checkbox"/>
	Goal is to maximize knowledge: Continuous CO, Arterial Line; Consider abdominal pressures, ScvO2 monitoring, Echocardiography, IVC ultrasound measurement	<input type="checkbox"/>	<input type="checkbox"/>
Sleep	<i>Consider day/night cycling if able.</i>	<input type="checkbox"/>	<input type="checkbox"/>
Rehabilitation	Is the patient being positioned and receiving ROM therapy at least every 4 hours?	<input type="checkbox"/>	<input type="checkbox"/>
	Do not prioritize rehabilitation; prioritize other care first.	<input type="checkbox"/>	<input type="checkbox"/>
Nutrition	If shock and holding enteral feeds, consider TPN.	<input type="checkbox"/>	<input type="checkbox"/>
Medications	This patient should be on continuous, titratable IV medications.	<input type="checkbox"/>	<input type="checkbox"/>
	<i>Consider stopping/holding enteral medications.</i>	<input type="checkbox"/>	<input type="checkbox"/>

B. Patient's Current Treatments

Make a noticeable "X" ANYWHERE the scales below that indicates the patient's current treatments.

Text in each section is organized by objective/goal in bold type, recommendations in regular type, and considerations in italic type.

Severity of Illness <i>(summary assessment)</i>	 <div style="display: flex; justify-content: space-between; font-size: small;"> Most sick, Potential Demise Least Sick, Could transfer today </div>									
Analgesia & Sedation	<table border="0" style="width: 100%; font-size: small;"> <tr> <td style="width: 25%; text-align: center;"> Maximal/Controlled Sedation Fentanyl & Versed +/- Paralyzed IV Continuous + IV Scheduled & PRN Narcotics and Sedatives </td> <td style="width: 25%; text-align: center;"> Moderate Sedation (RASS -3 to -2) *Arousable Patient IV/Enteral Scheduled/PRN Narcotics & Sedatives </td> <td style="width: 25%; text-align: center;"> Light Sedation (RASS -2 to -1) *Weaning PO/Enteral PRN Narcotics +/- Scheduled Enteral Narcotics </td> <td style="width: 25%; text-align: center;"> No Sedation (RASS 0) *Awake & Participatory Patient PO/Enteral PRN Narcotics <i>Tx Anxiety</i> </td> </tr> </table>					Maximal/Controlled Sedation Fentanyl & Versed +/- Paralyzed IV Continuous + IV Scheduled & PRN Narcotics and Sedatives	Moderate Sedation (RASS -3 to -2) *Arousable Patient IV/Enteral Scheduled/PRN Narcotics & Sedatives	Light Sedation (RASS -2 to -1) *Weaning PO/Enteral PRN Narcotics +/- Scheduled Enteral Narcotics	No Sedation (RASS 0) *Awake & Participatory Patient PO/Enteral PRN Narcotics <i>Tx Anxiety</i>	
Maximal/Controlled Sedation Fentanyl & Versed +/- Paralyzed IV Continuous + IV Scheduled & PRN Narcotics and Sedatives	Moderate Sedation (RASS -3 to -2) *Arousable Patient IV/Enteral Scheduled/PRN Narcotics & Sedatives	Light Sedation (RASS -2 to -1) *Weaning PO/Enteral PRN Narcotics +/- Scheduled Enteral Narcotics	No Sedation (RASS 0) *Awake & Participatory Patient PO/Enteral PRN Narcotics <i>Tx Anxiety</i>							
Mechanical Ventilation Goal: Minimize VILI, liberation ASAP	<table border="0" style="width: 100%; font-size: small;"> <tr> <td style="width: 33%; text-align: center;"> Controlled/Assisted (vent does Work of Breathing) VDR or Low Tidal Volume AC/VC <i>Open Lung Approach: ↑ PEEP, ↓ Vt</i> </td> <td style="width: 33%; text-align: center;"> Wean/Decrease with Supported Mode Transition to APRV or CPAP or CPAP/PS or AC/VC Sedation Holiday & Breathing Trial </td> <td style="width: 33%; text-align: center;"> Spontaneous/Liberated Sedation Holiday & Breathing or Trach Trial CPAP, extubate, or trach collar </td> </tr> </table>					Controlled/Assisted (vent does Work of Breathing) VDR or Low Tidal Volume AC/VC <i>Open Lung Approach: ↑ PEEP, ↓ Vt</i>	Wean/Decrease with Supported Mode Transition to APRV or CPAP or CPAP/PS or AC/VC Sedation Holiday & Breathing Trial	Spontaneous/Liberated Sedation Holiday & Breathing or Trach Trial CPAP, extubate, or trach collar		
Controlled/Assisted (vent does Work of Breathing) VDR or Low Tidal Volume AC/VC <i>Open Lung Approach: ↑ PEEP, ↓ Vt</i>	Wean/Decrease with Supported Mode Transition to APRV or CPAP or CPAP/PS or AC/VC Sedation Holiday & Breathing Trial	Spontaneous/Liberated Sedation Holiday & Breathing or Trach Trial CPAP, extubate, or trach collar								
Labs Goal: Information availability & minimize blood loss	<table border="0" style="width: 100%; font-size: small;"> <tr> <td style="width: 33%; text-align: center;"> More Frequent Q4-Q6: ABG, VBG/SvO₂, Lactate, CBC, Chem Q12-24: LFT TEG, Coags </td> <td style="width: 33%; text-align: center;"> Less Frequent/Daily Q12-Q24: ABG, CBC, Chem Q24-Qweek: LFT, Coag <i>*Pedi Tubes*</i> </td> <td style="width: 33%; text-align: center;"> Normal (As Needed/Intermittent) QOD-QMWF: CBC, Chem Qweek: LFT, Coag <i>PRN Labs only</i> </td> </tr> </table>					More Frequent Q4-Q6: ABG, VBG/SvO ₂ , Lactate, CBC, Chem Q12-24: LFT TEG, Coags	Less Frequent/Daily Q12-Q24: ABG, CBC, Chem Q24-Qweek: LFT, Coag <i>*Pedi Tubes*</i>	Normal (As Needed/Intermittent) QOD-QMWF: CBC, Chem Qweek: LFT, Coag <i>PRN Labs only</i>		
More Frequent Q4-Q6: ABG, VBG/SvO ₂ , Lactate, CBC, Chem Q12-24: LFT TEG, Coags	Less Frequent/Daily Q12-Q24: ABG, CBC, Chem Q24-Qweek: LFT, Coag <i>*Pedi Tubes*</i>	Normal (As Needed/Intermittent) QOD-QMWF: CBC, Chem Qweek: LFT, Coag <i>PRN Labs only</i>								
Sleep Goal: Minimize Delirium	<table border="0" style="width: 100%; font-size: small;"> <tr> <td style="width: 33%; text-align: center;"> Goal 8 hours Avoid awakening 8 hrs at night Day/Night Cycle, <i>Sleep aid</i> </td> <td style="width: 33%; text-align: center;"> Goal 4 hours Avoid awakening 4 hrs at night Day/Night Cycle, Ear Plugs </td> <td style="width: 33%; text-align: center;"> As Able Day/Night Cycle </td> </tr> </table>					Goal 8 hours Avoid awakening 8 hrs at night Day/Night Cycle, <i>Sleep aid</i>	Goal 4 hours Avoid awakening 4 hrs at night Day/Night Cycle, Ear Plugs	As Able Day/Night Cycle		
Goal 8 hours Avoid awakening 8 hrs at night Day/Night Cycle, <i>Sleep aid</i>	Goal 4 hours Avoid awakening 4 hrs at night Day/Night Cycle, Ear Plugs	As Able Day/Night Cycle								
Monitoring Routine monitoring (Tele, SpO ₂ , RR, NBP) Plus the following:	<table border="0" style="width: 100%; font-size: small;"> <tr> <td style="width: 33%; text-align: center;"> Continuous, More #, More Invasive + Routine A-Line, CVP, CO/CI+SVR/SVRI, EtCO₂, Abdominal Pressures, TTE/IVC measurement </td> <td style="width: 33%; text-align: center;"> Routine EtCO₂, A-Line, ±CVP </td> <td style="width: 33%; text-align: center;"> Less, Less Invasive <i>Decrease NBP measurements overnight</i> <i>Remove Foley</i> </td> </tr> </table>					Continuous, More #, More Invasive + Routine A-Line, CVP, CO/CI+SVR/SVRI, EtCO ₂ , Abdominal Pressures, TTE/IVC measurement	Routine EtCO ₂ , A-Line, ±CVP	Less, Less Invasive <i>Decrease NBP measurements overnight</i> <i>Remove Foley</i>		
Continuous, More #, More Invasive + Routine A-Line, CVP, CO/CI+SVR/SVRI, EtCO ₂ , Abdominal Pressures, TTE/IVC measurement	Routine EtCO ₂ , A-Line, ±CVP	Less, Less Invasive <i>Decrease NBP measurements overnight</i> <i>Remove Foley</i>								
Rehabilitation	<table border="0" style="width: 100%; font-size: small;"> <tr> <td style="width: 33%; text-align: center;"> None or As Able None or ROM/Positioning Q2hrs <i>Splinting</i> </td> <td style="width: 33%; text-align: center;"> As Tolerated to Maintain or Improve Function General Progression: ROM → Bed-to-Chair Position/Cardiac Chair → Dangle/Tilt/Stand <i>Splinting</i> </td> <td style="width: 33%; text-align: center;"> Improve Function to March/Walk → Go Outside! <i>Splinting</i> </td> </tr> </table>					None or As Able None or ROM/Positioning Q2hrs <i>Splinting</i>	As Tolerated to Maintain or Improve Function General Progression: ROM → Bed-to-Chair Position/Cardiac Chair → Dangle/Tilt/Stand <i>Splinting</i>	Improve Function to March/Walk → Go Outside! <i>Splinting</i>		
None or As Able None or ROM/Positioning Q2hrs <i>Splinting</i>	As Tolerated to Maintain or Improve Function General Progression: ROM → Bed-to-Chair Position/Cardiac Chair → Dangle/Tilt/Stand <i>Splinting</i>	Improve Function to March/Walk → Go Outside! <i>Splinting</i>								
Nutrition Goal: Minimize loss of lean mass	<table border="0" style="width: 100%; font-size: small;"> <tr> <td style="width: 20%; text-align: center;"> Holding Enteral Feed, Consider TPN </td> <td style="width: 15%; text-align: center;"> Enteral Feeds <i>Trophic Rate</i> </td> <td style="width: 15%; text-align: center;"> Full Support Enteral </td> <td style="width: 20%; text-align: center;"> Full Support Enteral and PO including supplements </td> <td style="width: 30%; text-align: center;"> Self-Feeding PO and supplements </td> </tr> </table>					Holding Enteral Feed, Consider TPN	Enteral Feeds <i>Trophic Rate</i>	Full Support Enteral	Full Support Enteral and PO including supplements	Self-Feeding PO and supplements
Holding Enteral Feed, Consider TPN	Enteral Feeds <i>Trophic Rate</i>	Full Support Enteral	Full Support Enteral and PO including supplements	Self-Feeding PO and supplements						
Fluid Goal Goal: Maintain organ perfusion; Avoid volume overload	<table border="0" style="width: 100%; font-size: small;"> <tr> <td style="width: 33%; text-align: center;"> Targeted Resuscitation/No over resuscitation Give fluids only to achieve defined goal <i>Lactate decrease by 10% in 4 hrs</i> <i>ScvO₂ > 70%, UOP > 0.5ml/kg/hr</i> <i>Blood and Colloids to avoid over resuscitation</i> </td> <td style="width: 33%; text-align: center;"> Targeted Management for Euvolemia Assess intravascular volume status daily Define Goal: Positive, Negative, or even <i>Fluid challenge</i> <i>Diuretic challenge</i> </td> <td style="width: 33%; text-align: center;"> Self-Management of Fluid Balance No maintenance fluids </td> </tr> </table>					Targeted Resuscitation/No over resuscitation Give fluids only to achieve defined goal <i>Lactate decrease by 10% in 4 hrs</i> <i>ScvO₂ > 70%, UOP > 0.5ml/kg/hr</i> <i>Blood and Colloids to avoid over resuscitation</i>	Targeted Management for Euvolemia Assess intravascular volume status daily Define Goal: Positive, Negative, or even <i>Fluid challenge</i> <i>Diuretic challenge</i>	Self-Management of Fluid Balance No maintenance fluids		
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Access Date of Insertion _____	<table border="0" style="width: 100%; font-size: small;"> <tr> <td style="width: 33%; text-align: center;"> Adequate access Central line ≥ 3 ports, A-Line <i>Swan-Ganz</i> </td> <td style="width: 33%; text-align: center;"> Balance access & Infection ≥ 2 Ports <i>Remove arterial line</i> </td> <td style="width: 33%; text-align: center;"> Minimize Infection Peripheral, 1-2 Ports <i>PICC</i> </td> </tr> </table>					Adequate access Central line ≥ 3 ports, A-Line <i>Swan-Ganz</i>	Balance access & Infection ≥ 2 Ports <i>Remove arterial line</i>	Minimize Infection Peripheral, 1-2 Ports <i>PICC</i>		
Adequate access Central line ≥ 3 ports, A-Line <i>Swan-Ganz</i>	Balance access & Infection ≥ 2 Ports <i>Remove arterial line</i>	Minimize Infection Peripheral, 1-2 Ports <i>PICC</i>								
Wound Care	<table border="0" style="width: 100%; font-size: small;"> <tr> <td style="width: 25%; text-align: center;"> Perform Daily WC Early with as Many Assistants as Possible </td> <td style="width: 25%; text-align: center;"> Daily Showers with wound Care and as Many Assistants as Possible </td> <td style="width: 25%; text-align: center;"> Wound Care Less Often with Fewer Assisting </td> <td style="width: 25%; text-align: center;"> <i>Simple or Self-care</i> </td> </tr> </table>					Perform Daily WC Early with as Many Assistants as Possible	Daily Showers with wound Care and as Many Assistants as Possible	Wound Care Less Often with Fewer Assisting	<i>Simple or Self-care</i>	
Perform Daily WC Early with as Many Assistants as Possible	Daily Showers with wound Care and as Many Assistants as Possible	Wound Care Less Often with Fewer Assisting	<i>Simple or Self-care</i>							
Medications Goal: Minimize polypharmacy	<table border="0" style="width: 100%; font-size: small;"> <tr> <td style="width: 25%; text-align: center;"> Scheduled + PRN More IV + Some Enteral </td> <td style="width: 25%; text-align: center;"> More Enteral/PO Scheduled + IV PRN Some PO </td> <td style="width: 25%; text-align: center;"> More PRN More PO Some Enteral </td> <td style="width: 25%;"></td> </tr> </table>					Scheduled + PRN More IV + Some Enteral	More Enteral/PO Scheduled + IV PRN Some PO	More PRN More PO Some Enteral		
Scheduled + PRN More IV + Some Enteral	More Enteral/PO Scheduled + IV PRN Some PO	More PRN More PO Some Enteral								

APPENDIX D. TeamView Tools

USAISR Original

USAISR Update – Proposed

USAISR ECMO

Dallas Proposed

Houston

See Next 5 Pages

Severity of Illness (transfer from scales tool)



Date	HD#	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Could Die Most Sick																						
Least Sick Could Transfer																						
% Open																						
Hrs Sleep Last Night																						
Coordinating Activities <small>See code list behind Scales Tool for codes.</small>																						

Update Checklist items daily!

	NA	Good	Discuss
GI Prophylaxis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
CHG Prophylaxis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
HOB > 30 degrees	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
DVT Prophylaxis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Last BM < 48 hrs ago	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Respiratory Orders Current	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Family has questions	<input type="checkbox"/>		<input type="checkbox"/>
Delirium Positive	<input type="checkbox"/>		<input type="checkbox"/>
Pending Cultures	<input type="checkbox"/>		<input type="checkbox"/>

Antibiotic(s)	NA <input type="checkbox"/>	Effective Start Date	Planned Stop Date	Diagnosis

Goals (completed during rounds)

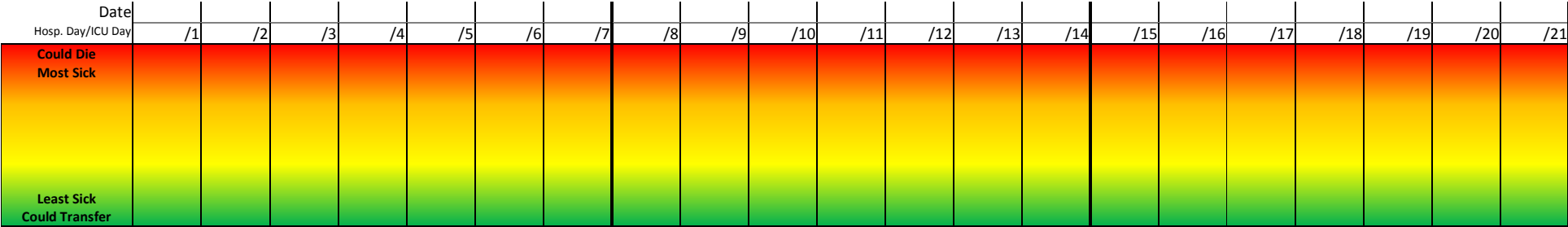
Fluid volume goal for today:

- ☐ Positive
- ☐ Negative
- ☐ Even

Major Goal(s) for the next 24-48 hours:

Severity of Illness (transfer from scales tool)

Allergies Code Status



Status

Place "X" or description where these occur and circle planned events	% Open																				
	OR																				
	Dressings "Down-Day"																				
	Rehab Completed																				
	Central Line																				
	Arterial Line																				
	Dialysis Cath																				
	Extubation																				
	Intubation																				
	BM																				
	Cultures																				
	Other Events (e.g. family meeting, etc.)																				

Recommendations/Messages	Major Problem List	Antibiotic(s)	NA <input type="checkbox"/>	Effective Start Date	Planned Stop Date	Diagnosis

Goals (completed during rounds)

Fluid volume goal for today:

☐ Positive _____ L

☐ Negative _____ L

☐ Even = + _____ L

The most important goal(s) for today (what we must do to be successful):

Priorities:

___ Wound Care ___ Rehab

___ Procedure(s) ___ Imaging

___ SH/BT ___ Extubation

___ Other _____

Severity of Illness (transfer from scales tool)

Allergies

Code Status

Date HospDay/ECMO Day	/1	/2	/3	/4	/5	/6	/7	/8	/9	/10	/11	/12	/13	/14	/15	/16	/17	/18	/19	/20	/21
Could Die Most Sick																					
Could Decannulate																					

Status

Flow/ RPM																				
Delta P																				
Circuit PaO2																				
Sweep																				
Patient PaO2																				
Patient PaCO2																				
Compliance																				
PRBC																				
FFP																				
PLT																				
Cryo																				
Amicar/TXA																				
Rehab																				
Other Events (e.g. Procedures)																				

Recommendations/Messages

Antibiotic(s)	NA <input type="checkbox"/>	Effective Start Date	Planned Stop Date	Diagnosis

Goals (completed during rounds)

Fluid volume goal for today:

☐ Positive _____ L

☐ Negative _____ L

☐ Even = + _____ L

The most important goal(s) for today (what we must do to be successful):

Priorities:

☐ Wound Care ☐ Rehab

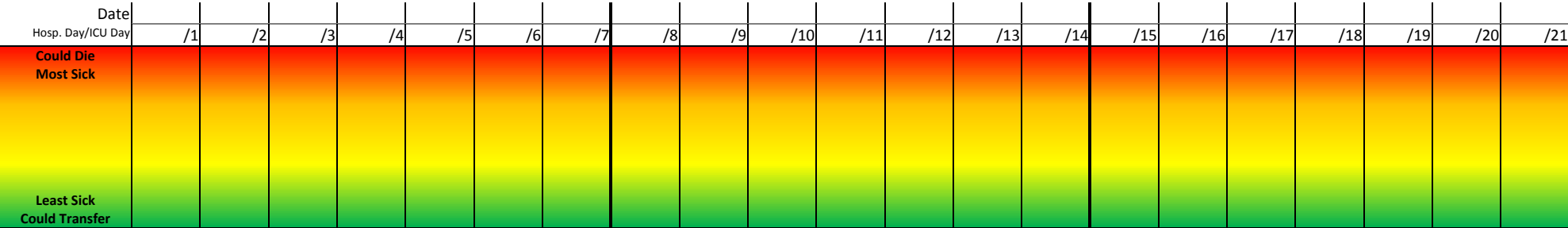
☐ Procedure(s) ☐ Imaging

☐ Other _____

Severity of Illness (transfer from scales tool)

Allergies

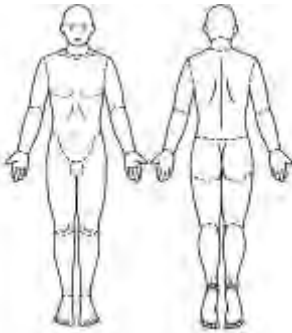
Code Status

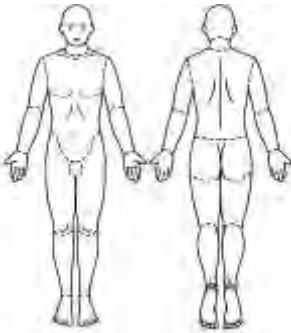


Status

Place "X" or description where these occur and <i>circle</i> planned events	% Open																			
	OR																			
	Dressings																			
	"Down-Day"																			
	% Feeding																			
	Central Line																			
	Arterial Line																			
	Foley																			
	BM																			
	Cultures																			
	Other Events (e.g. family meeting, etc.)																			

Major Problem List





Draw Current Wounds

Indicate Wound Care

Antibiotic(s)

NA

Start Date/Stop Date

Diagnosis

Recommendations/Messages

Goals (completed during rounds)

Fluid volume goal for today:

Positive

L

Negative

L

Even = +

L

The most important goal(s) for today (what we must do to be successful):

Priorities:

Wound Care

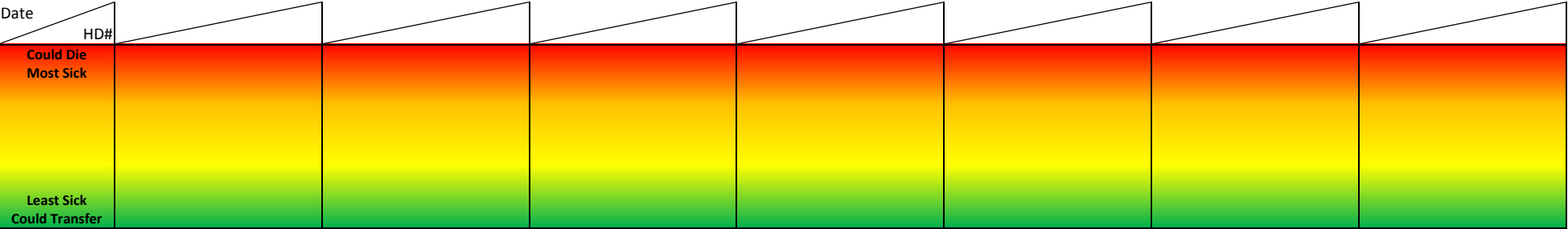
Rehab

Procedure(s)

Imaging

Other

Severity of Illness (transfer from scales tool)



Status

% Open							
% Feeding Achieved							
Biggest Issue							
Coordinating Activities <small>See code list behind Scales Tool for codes.</small>							

Update Checklist items daily!

	NA	Good	Discuss
GI Prophylaxis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
CHG Prophylaxis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
HOB > 30 degrees	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
DVT Prophylaxis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Last BM < 48 hrs ago	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Respiratory Orders Current	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Family has questions	<input type="checkbox"/>		<input type="checkbox"/>
Delirium Positive	<input type="checkbox"/>		<input type="checkbox"/>
Pending Cultures	<input type="checkbox"/>		<input type="checkbox"/>

Antibiotic(s)	NA <input type="checkbox"/>	Effective Start Date	Planned Stop Date	Diagnosis

Goals (completed during rounds)

Major Goal(s) for next 24-48 hours (*Star Primary Goal*)

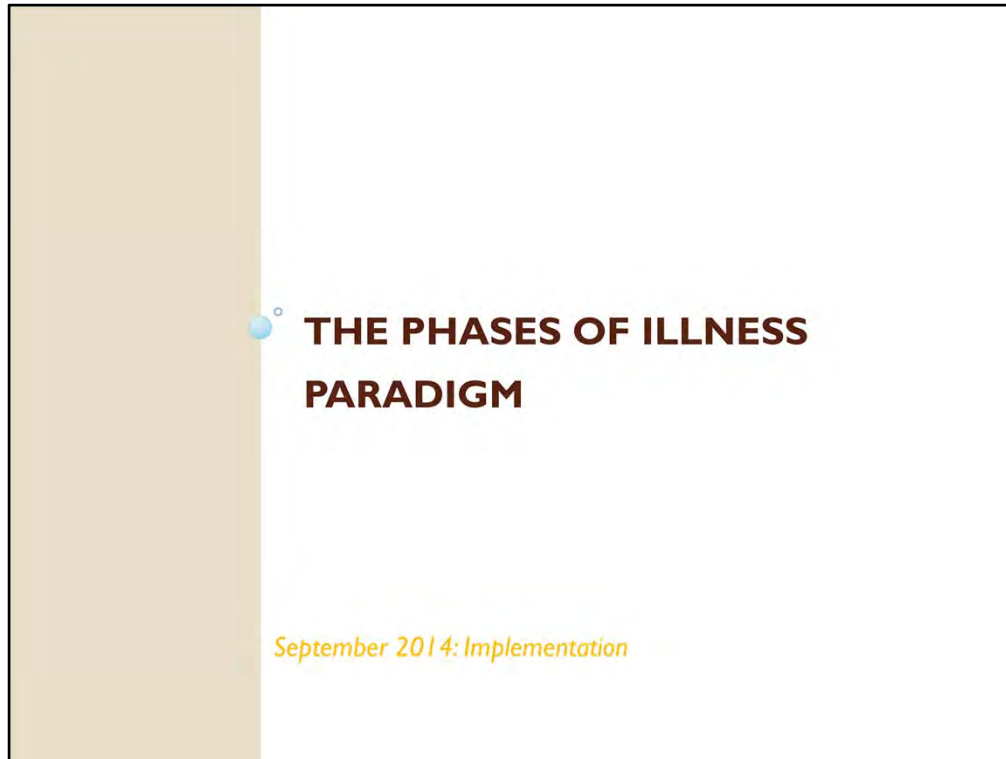
Priorities of care to achieve these goals

Fluid volume goal for today:

- ☐ Positive
- ☐ Negative
- ☐ Even

APPENDIX E. USAISR In-Service

See Next 20 Pages



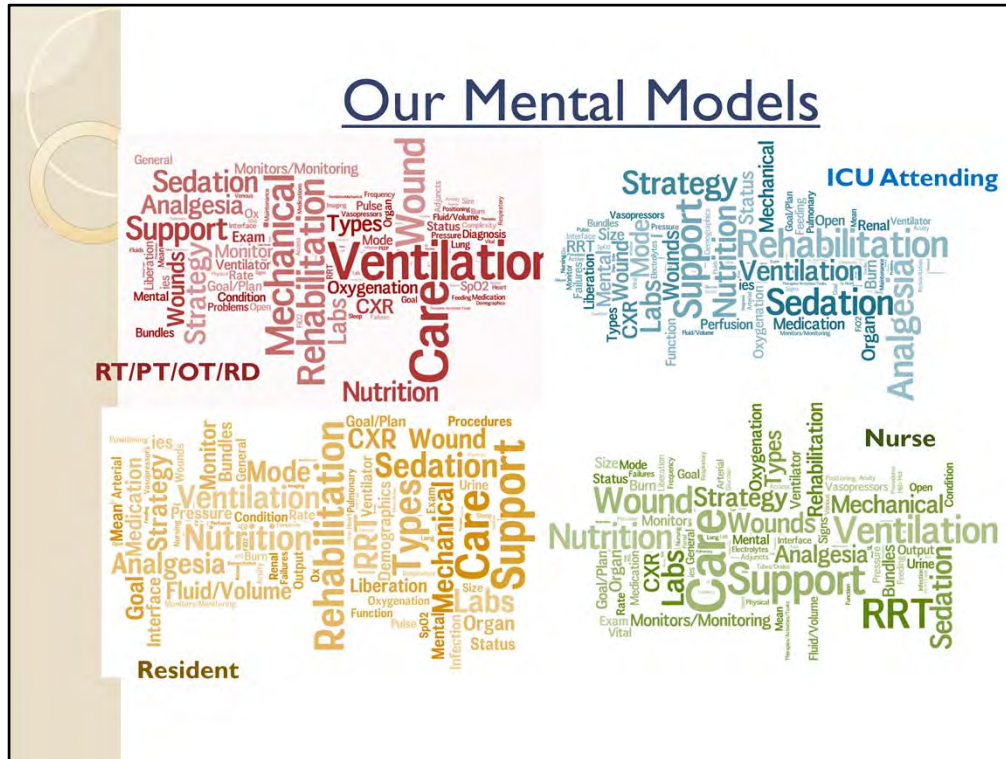
Starting in September this POIP research project will begin the implementation task that will run for 12 months. We will update these tools with user and expert feedback AT LEAST at the six month mark, and possibly sooner.



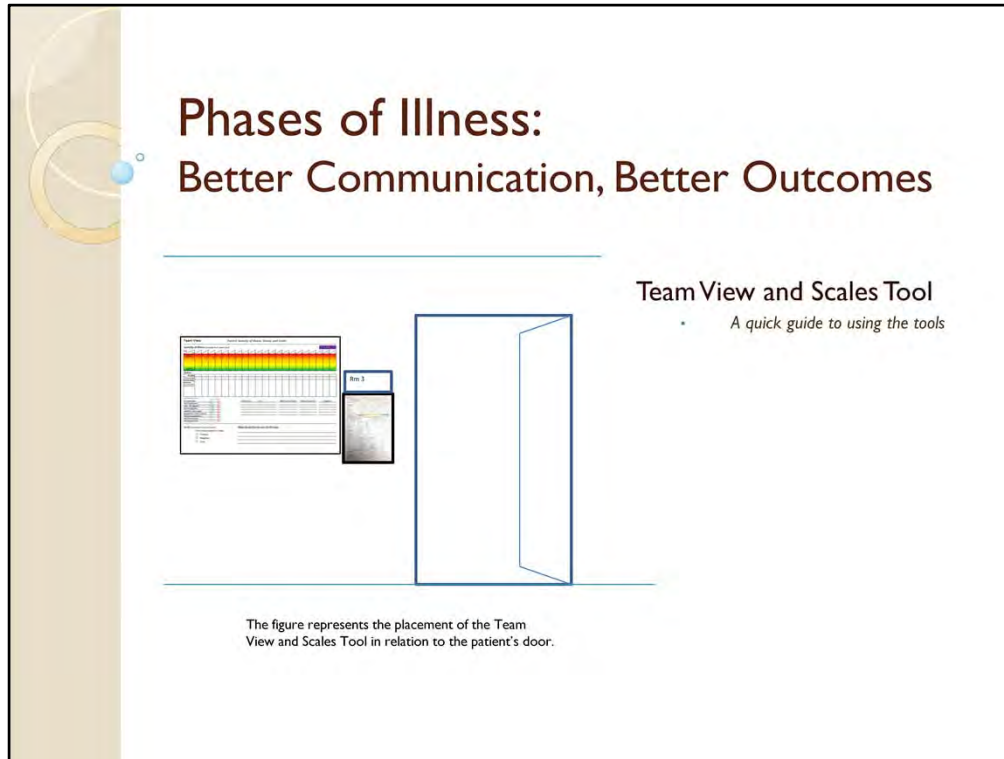
The Phases of Illness:

- A funded research project to create and implement checklist tools for use in the Burn ICU.
- **Team care** is challenged by **communication lapses** that are
 - impacted by professional silos and may
 - **cause discordant care.**
- **Cognitive aids improve care**
 - by aiding clinical decision making
 - through **decision support**
- **The POIP is a shared mental model that**
 - helps align patient goals, tasks, and objectives that
 - **may improve care.**

Our Mental Models



This is some of the data from our research showing how different our mental models are for the same patients.



The research we have conducted included the Condition Understanding Survey (CUS), NASA-TLX, TeamSTEPPs, a clinician card sort, group interviews and Delphi consensus building.

The data gathered supported each element of this research project.

The research resulted in 2 tools, one large poster-sized tool and a smaller checklist tool.

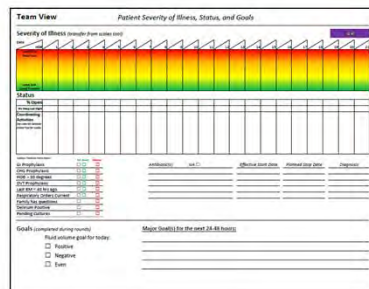
Placed outside the patient's room the tools are available for any team member, and eventually family, to use to understand patient condition better.

The Tools: Use Overview

Scales Tool

The Scales Tool is a vertical checklist form. It contains multiple sections with various checkboxes and text fields for recording patient data. A color-coded bar at the top indicates different levels of patient status.

Team View

The Team View form is a horizontal chart titled "Patient Severity of Illness, Status, and Goals". It features a color-coded bar at the top representing patient severity. Below the bar are several columns for tracking patient status and goals over time. The form includes checkboxes for "Goals completed during round" and "Patient status goal for today".

Overview

There are 2 tools, a "Team View" and a "Scales Tool"; the team view is located outside the patient's door at all times, the scales tool is a smaller clipboard sized checklist. Both will be laminated so that either dry erase or permanent marker can be used (removed with ETOH swabs). We recommend permanent marker be used for all but the Goals section.

Scales Tool: Intent

- To facilitate communication of key patient condition and treatment
- Highlights perception and allows others to understand perception
- Identifies discordant care (condition and treatments are not aligned)
- Tool for nurses to use together on rounds
- To improve patient care

The "Scales Tool" is primarily used by the nurse during shift change. The nurse, based upon their assessment, mark on the continuous scales where they perceive their patient to be. The top part is the patient's current condition. There is a continuous scale going from Red to Green, next. This is a summative severity of illness score that the nurse makes based upon their perception. This score is transferred to the Team View located outside the patient's room. The last part of the scales tool consists of current treatments.


We recommend that BOTH nurses use the tool during shift change. One way for the nurses to use the tool would be to have the off going nurse fill in the scales as each care element is discussed. Later, the on coming nurse can update the tool by making changes based on their perception of the patient.

Scales Tool: Details

- We recommend that the tool be:
 - completed by **both** nurses at **change of shift**
 - updated by nurse **as needed during shift**
- After Severity of Illness score is determined it is transferred to the Team View. It is then
 - discussed on rounds by the team

These tools are NOT mandatory. We are providing the tools as cognitive aids to improve understanding of patient condition and as a clinical decision support tool to help identify discordant care.

We hope that the tools facilitate communication across specialties and experience levels.

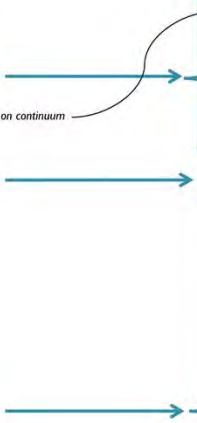


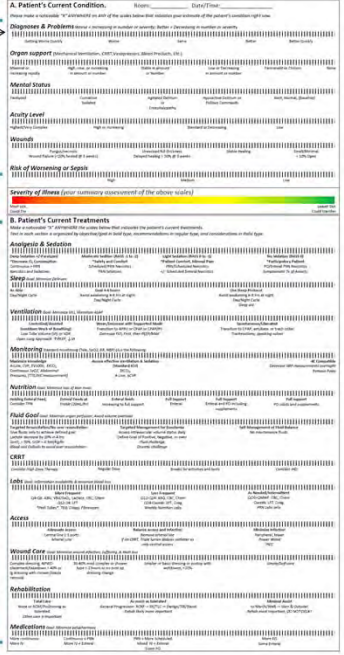
1. The nurses determine the patient's current condition during rounds

2. The patient's severity of illness is based upon the current condition

3. Then the nurses determine the patient's current treatments

Make marks on continuum






There is no 'RIGHT' answer when completing the scales tool, only your perception!

NOTE: the treatment section does not contribute to the condition section, it is descriptive of the patient's current treatments.

This is an example of a completed Scales Tool.



A. Patient's Current Condition. Room: 3 Date/Time: 5/3/2020
Please make a tickable "X" at the point on each of the scales below that indicates your estimate of the patient's condition right now.

Diagnoses & Problems (Marking the number of severity, greater = increasing or worsening of condition)
 Organ support (Invasive/Noninvasive, ARDS, Shock, etc.)
 Mental status (Alert, Oriented, etc.)
 Acuity Level (1-5)
 Wounds (Healing, etc.)
 Risk of Sepsis or Infection (Low, Moderate, High)
 Severity of illness (prior summary assessment of the above scales)

B. Patient's Current Treatments
 Analgesia & Sedation (Pain, Anxiety, etc.)
 Ventilation (Mechanical, etc.)
 Nutrition (Oral, IV, etc.)
 Fluid Goal (L/hr, etc.)
 CIRS (Confusion, Incontinence, etc.)
 Labs (Blood, Urine, etc.)
 Acute (Vitals, etc.)
 Wound Care (Dressing, etc.)
 Rehabilitation (Physical, etc.)
 Medications (Pain, etc.)

Theoretical Underpinnings

The theory behind this tool is that current condition and treatments should align. If they don't align, this may indicate discordant care. For example, a patient that is getting sicker will probably have more tick marks to the left of the scales. They will have increasing or worsening diagnoses and problems, require more organ support, may decline in mental status, acuity will increase, labs may show more derangement, wounds may not be healing or getting worse, and their risk of sepsis may be high. Yet, they may not have enough line access to support the increase in care, or some other treatment component may not be in line with what the patient needs. This frequently happens in the clinical environment where things are changing for the patient but the clinical treatments have not caught up. The tool can help expose discordant care and help facilitate communication between team members.

A. Patient's Current Condition. Room: 3 Date/Time: 6/2/2020

Please make a notation "N/A" if not applicable on any of the scales below that indicates your estimate of the patient's condition right now:

Diagnoses & Problems

Organ support

Mental Status

Anxiety Level

Wounds

Risk of Worsening or Regain

Severity of illness (your summary assessment of the above scales)

B. Patient's Current Treatments

Anesthetics & Sedation

Sleep

Ventilation

Monitoring

Nutrition

Fluid Goal

CRRT

Labs

Access

Wound Care

Rehabilitation

Medications

A. Patient's Current Condition. Room: 3 Date/Time: 6/2/2020

Please make a notation "N/A" if not applicable on any of the scales below that indicates your estimate of the patient's condition right now:

Diagnoses & Problems

Organ support

Mental Status

Anxiety Level

Wounds

Risk of Worsening or Regain

Severity of illness (your summary assessment of the above scales)

B. Patient's Current Treatments

Anesthetics & Sedation

Sleep

Ventilation

Monitoring

Nutrition

Fluid Goal

CRRT

Labs

Access

Wound Care

Rehabilitation

Medications

Sleep practice is most “discordant” with patient condition and compared to other treatments.

Monitoring and labs most “discordant” with patient condition and compared to other treatment.

A. Patient's Current Condition. Room: 3 Date/Time: 5/3/2020
 Please make a notation "N" denoting an N/A if the notes below that indicates your schedule of the patient's condition right now.

Diagnoses & Problems (Please use ICD-10 codes for diagnosis and problem.)

Organ support (Respiratory, Hematologic, Cardiac, Renal, Hepatic, Endocrine, etc.)

Mental Status

Acuity Level

Wounds

Risk of Wound or Septic

Severity of Illness (your summary assessment of the above scales)

B. Patient's Current Treatments

Anesthetics & Sedation

Pain

Ventilation

Monitoring

Nutrition

Fluid Goal

CRRT

Lab

Agents

Wound Care

Rehabilitation

Medications

No Pattern... what are we doing?

Real User Feedback

“It helped me organize my thoughts”

“It gave me confidence [that my assessment was more accurate]”

“...report was more comprehensive using the tool.”

“It made the hand off more objective”

“Completing it together, we were able to talk out a couple of them [items on the scales tool].”

“It is more useful when the nurse is new to the patient.”

“May take longer, whoever fills it out, but these may be teaching moments.”

**Note: All subjects who used the tool more than once stated that it was faster to use the second time, especially if they had continuity with the patient (e.g. second or third day caring for the patient).

During the piloting of the tools nurses found that the scales helped them communicate the patient condition to the on coming nurse. Initially, nurses wanted to have the off coming nurse fill out the tool. But, later they learned that the tool is best used together because the on coming nurse has no knowledge of the patient and unless the tool is updated in real time, the on coming nurse does not use the tool.

Team View: Overview

- Used on rounds to expose patient care elements that need to be addressed by the team
- Presents the team's daily goals
- Sections completed or updated by different team members

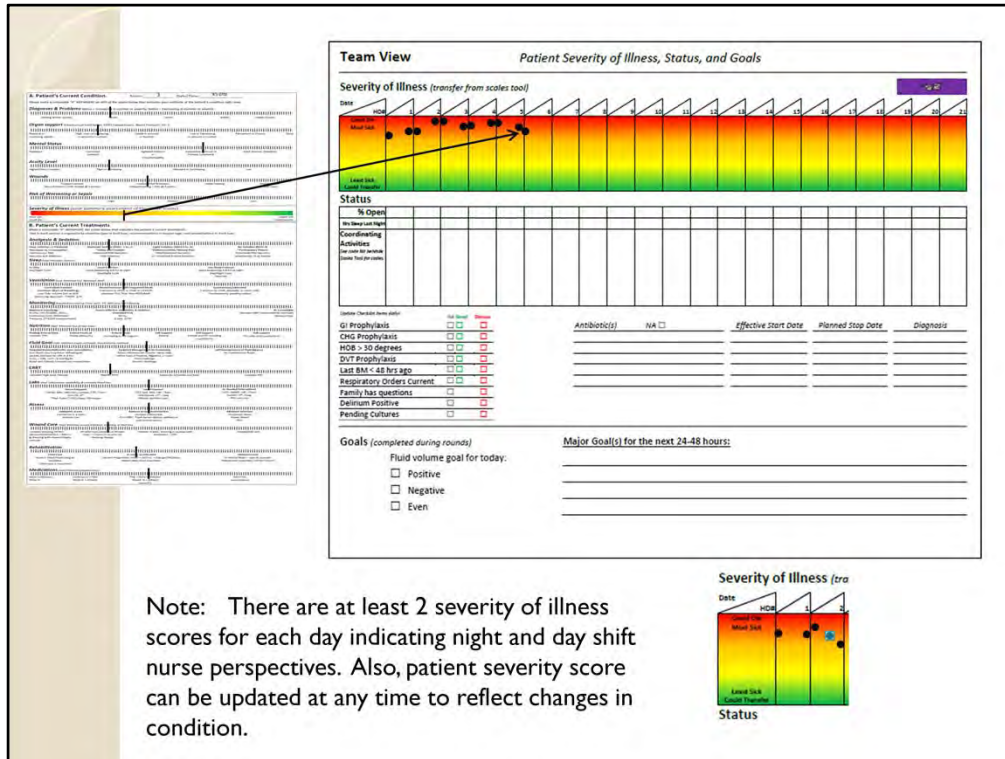
The scales reflect the continuous nature of some patient condition and treatment elements. However, not all elements are continuous, some are discrete--yes or no, go or no-go, issues. The Team View bedside checklist is located outside the patient's room and visible for all to see. The information on the board does not contain any patient identifiable information. It should not violate any patient privacy or create HIPAA violations.

One purpose of the Team View is to expose patient care elements that need discussion on rounds by the team. This helps avoid unnecessary discussion ("What antibiotic day are we on?", "When was that line placed?", "When is the next OR day?"). This may improve the time taken on rounds, or at least free up the discussion to address more important issues. Care bundles, delirium, pending cultures and family concerns are either "n/a", "good", or "discuss"--only elements with a checkmark on "discuss" are addressed on rounds. Any team member can update the board. There is a section titled "Coordinating Activities" where any team member can indicate when time sensitive elements (tube/line/drain placement, OR days, dressing down days, etc.) have been done. This is a visual schedule for all to see and to help plan future activities. Antibiotics have a separate section that anyone can fill in showing the effective start date, planned stop date, and the diagnosis that is being treated.

Another purpose is to help create a "shared mental model" for the entire team. We have found that our current situation reflects a team that often does not share the same perspective about the patient and that care can be negatively impacted by this

discordance. For example, our research shows that the nurse's perspective about the patient's most important priorities for the day tend to have the most impact on how the day will flow for the patient. Despite what is stated on rounds, ultimately the patient's daily plan is in the hands of the nurse. This is largely because the nurse spends the most time with the patient and is responsible for the 24/7 care that is required. The therapists reported to us that they know that "whoever gets in the room first gets priority" and they have created their own work around to get what they need done with the patient. The nurse in effect controls access to the patient.

This is not necessarily a problem, but it can create discordant care if the nurse's priorities for the patient do not match what the attending wanted on rounds, or what the resident perceives as important. The Team View addresses this displaying the "Major Goal (s) for the next 24-48 hours" for everyone to see. In this way, the team, led by the attending on rounds, determines what the priorities are and then it is written on the board. All team members, even those not present, can see what these priorities are because they are visible right outside the room 24/7.



Anyone can update the Team View as things change throughout the day.

Any team member can update this section of the Team View.

This section of the tool **alerts** the team about any standard care treatments that **need discussion on rounds**.

Also, the antibiotic (s) the patient is/are on and the respective start dates, planned stop dates and the diagnosis being treated.

Update Checklist Items daily!	Not	Good	OK/Yes	Antibiotic(s)	NA	Effective Start Date	Planned Stop Date	Diagnosis
GI Prophylaxis	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		<input checked="" type="checkbox"/>			
CHG Prophylaxis	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>					
HOB > 30 degrees	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>					
DVT Prophylaxis	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>					
Last BM < 48 hrs ago	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>					
Respiratory Orders Current	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>					
Family has questions	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>					
Delirium Positive	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
Pending Cultures	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					

The Goals section is updated on rounds.

Fluid goals are updated daily.

Major Goals for the next 24-48 hours are placed in the box and can help prioritize care for the day.

Goals (completed during rounds)	Major Goal(s) for the next 24-48 hours:
Fluid volume goal for today:	<u>ventilator Liberation</u>
<input type="checkbox"/> Positive	<u>Family Meeting</u>
<input type="checkbox"/> Negative	<u>Increased Mobility</u>
<input checked="" type="checkbox"/> Even	

Real User Feedback

- “I think this makes things more objective.”
- “I like the quick glance or ‘drive by’ aspect of the Team View.”
- “It forces you to re-prioritize and to focus on what is important.”
- Are there other ways you might use it?

Both tools consist of data that are directly from the research tools we used. The card sorts gave us the continuous scales and language associated with the severity of illness scores. The condition understanding survey (CUS) revealed that the team does not have a shared mental model and priorities (Goals, objectives and tasks) are not always aligned. The Delphi gave us consensus on the tool elements, and the group interviews validated the tools and the model. We have taken considerable time listening to staff and collected verbal and written feedback so that the end result would be an ecologically valid tool for this BICU.



Questions? Concerns?

- We welcome your feedback, questions and concerns....
 - Feel free to contact us!

The plan is to use the tool for 6 months, then make adjustments. We expect that initially the tools may add time to the reporting process at the bedside and on rounds. Most staff that tried the tools during the pilot phase quickly learned how to use the tools and by the second time were able to reduce the time spent filling out the tool.

As always, we are open to feedback and suggestions. Please take the time to review the ppt slides that we have created to educate the staff.

APPENDIX F. USAISR SBAR Report

See Next Page

SBAR Report Tool

Situation/Background

- ☐ Review TeamView
- ☐ Patient Condition Assessment
- ☐ PMH/Active Problems:

Assessment

- ☐ Review Treatment Scales
- ☐ Notes:

Recommendations

- ☐ Review Treatment Scale and identify discordance/discrepancies
- ☐ Notify physician team members or make notes on TeamView
- ☐ Notes:

APPENDIX G. Presented Abstracts

See Next 3 Pages



Developing Cognitive Aides According to the Phases of Illness Paradigm for use in the Burn ICU

Sarah J. Murray, MSN¹; Kevin Chung, MD, FCCM¹; Elizabeth Mann-Salinas, PhD, FCCM¹
 Maria Serio-Melvin, MSN¹; Todd Huzar, MD²; Steven Wolf, MD³; Christopher Nemeth, PhD⁴; Jeremy Pamplin, MD, FCCM¹

1. US Army Institute of Surgical Research, JBSA FSH, TX; 2. Memorial Hermann Hospital Texas Medical Center, Houston, TX; 3. Parkland Health and Hospital System, Dallas, TX; 4. Applied Research Associates, Inc., San Antonio, TX

Introduction

- Teams of individuals from different professional backgrounds, provide complex care for patients in Burn Intensive Care Units (BICUs)
 - Team care is challenged by communication lapses borne from differences.
 - Professional silos may produce discordant care.
- Well designed, ecologically valid cognitive aides help clinicians make decisions more efficiently, reliably, and accurately and may improve patient care.
 - Checklists, clinical pathways, order-sets, protocols, and guidelines are examples of cognitive aides that improve outcomes in healthcare.
- The Phases of Illness Paradigm (POIP) is a theoretical framework that intends to describe patients with similar severities of illness for which clinicians may define expected goals, objectives, and tasks of care.
- This research was designed to
 - Validate the POIP framework as shared mental model
 - Develop ecologically valid cognitive aides to support the POIP

Objectives

Primary

- To understand the BICU work domain in terms of patient condition, patient progress, and clinician behaviors in order to create ecologically valid cognitive aides.
- To improve the multidisciplinary Burn ICU team's understanding of patient condition, daily care priorities, and anticipated care goals.
- To validate the POIP as a shared mental model.

Secondary

- To further develop the POIP by investigating clinical behaviors in the environment it is meant to support.

Exploratory

- To determine if a shared mental model will improve clinician perception of communication, teamwork, work satisfaction, and cognitive workload in the burn ICU.

Discussion

- BICU clinicians think about patients in different ways.
- Shared mental models may improve team understanding of patient condition and care priorities.
- Although patient condition is a continuum, clinicians perceive certain types of care more discretely along that continuum and may anticipate priorities of care accordingly.
- Tools may improve recognition of discordant care and may expose differences of perspectives which may foster improved communication.

Key Points

- The described research will develop an ecologically valid cognitive aide to support clinical decision making in the BICU.
- We anticipate that the POIP will:
 - decrease cognitive load
 - improve communication
 - make care more reliable

Methodology

This Institutional Review Board approved protocol includes mixed methods, participatory research project broken down into four main tasks:

Task 1: Describe a Patient's progress through the BICU

- Condition Understanding Survey
- NASA-TLX Survey
- TeamSTEPPS Survey
- Clinician Card Sort: Q Methodology
- Group Interview

Task 2: Develop Representations of Patient Progress

- Delphi Consensus Building
 - The elements from the card sorts and group interviews were correlated with severity of illness scores on the scales.
 - 80% consensus was achieved on each of the elements for the final version.
- Group Interview

Task 3: Implement the POIP in the BICU

- Clinicians perceive patient condition along a continuum
- Two tools emerged from the data:
 - A "scales tool" that is granular and identifies clinician perception of patient status along the continuum of care.
 - A "checklist" tool for discrete data elements of care and to provide a summative report.

Task 4: Review and Update

- Once implemented, a continuous improvement process will occur with updates as needed.
- Prospective and retrospective data is collected to compare clinician perspectives and patient outcomes before and after POIP implementation.

Acknowledgements

- We would like to thank Nicole Caldwell, RN for her instrumental assistance in facilitating this project.
- Funding: This project is supported by a grant from the US Army Medical Research and Materiel Command Telemedicine and Advanced Technology Research Center (TATRC) (W81XWH-13-2-0011)



Card Sorts Help “Unpack” Clinician Perspectives on Patient Condition and Treatment Priorities

Jeremy Pamplin, MD, FACP¹; Sarah J. Murray, MSN¹; Kevin Chung, MD, FCCM¹; Elizabeth Mann-Salinas, PhD, RN, FCCM¹
Maria Serio-Melvin, MSN¹; Todd Huzar, MD²; Steven Wolf, MD, FACS³; Christopher Nemeth, PhD⁴



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Introduction

Understanding clinician decision making is challenging, especially in complex work settings like the burn intensive care unit (BICU).

Qualitative research methodologies are best suited for this type of research, but require special training and experience to be proficient and significant time to perform.

Available time to participate in qualitative research is limited for busy clinicians.

Card sorts are a tool used to elicit human perceptions (their “mental models”), particularly about priorities and organization of information^{1,2}.

Hypothesis

We hypothesized that card sorting might help BICU clinicians identify and prioritize the information and care elements they use to identify patient condition and associated treatments.

Methods

This research was conducted as part of a larger, multi-institutional human use protocol approved by local institutional review boards to develop cognitive aids that support communication and improve clinical decision making in 3 Burn ICUs using the **Phases of Illness Paradigm**³.

We developed a card sort tool through serial interviews with experts in burn critical care to investigate how clinicians perceive patient condition (i.e. severity of illness) and prioritize care accordingly.

Interviews discovered 10 categories of “features” that clinicians use to identify patient condition and 9 categories of “treatments.”

This resulted in 97 total cards: 67 features and 30 treatments, although during the card sort clinicians were permitted to create cards not otherwise available.

During card sorts, clinicians were asked to identify a patient’s severity of illness on a 10 point Likert scale from “could die today” to “could leave the ICU today.”

Clinicians then reviewed either feature or treatment cards and selected cards they considered important (**figure 1 & 2**).

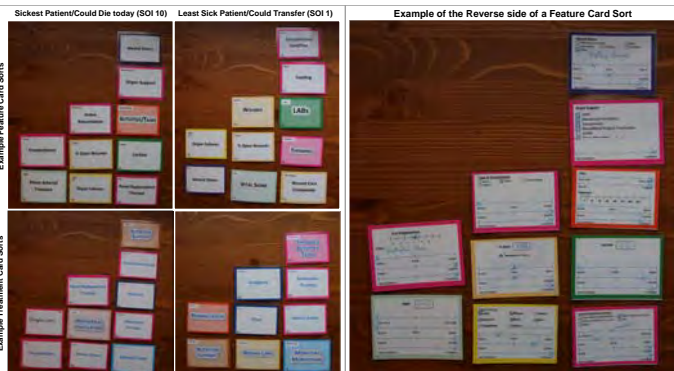
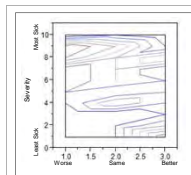


Figure 1. Comparison of feature and treatment card sorts for the sickest and least sick patients. The ultimate card sort is a visual representation of the priority clinicians place on information or treatment categories used to determine patient condition and optimal treatment. The bottom left card is the “most important” and the top right card is “least important.”
SOI, Severity of Illness

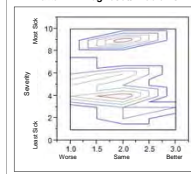
Figure 2. Example of the reverse side of cards where clinicians add details to better identify important aspects of features or treatments.

Preliminary Results

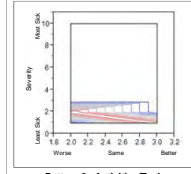
- 133 card sorts were completed by clinicians from three backgrounds (54 nurses, 48 physicians, 31 others) caring for 70 patients at two of the research locations.
- Clinician experience ranged from 0-42 years.
- Card sorts took on average 35 minutes to complete.
- Of the cards chosen, $48 \pm 23\%$ of feature cards and $55 \pm 25\%$ of treatment cards were identical.
- Clinicians identified severity of illness similarly (< 2 point difference), although there were notable “Outliers.”
 - In seven patients the difference between min/max assessment was > 3 points.
- The median number of cards sorted was fewer than the allowed number of 15 cards per sort:
 - Features: 9 (range 3-16)
 - Treatments: 7 (range 3-14)



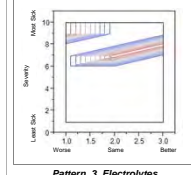
Pattern 1. Diagnoses/Problems



Pattern 2. Chest XR



Pattern 3. Activities/Tasks



Pattern 4. Electrolytes

Figure 3. Feature patterns. Representative examples are shown. Pattern 1, clinicians consider a feature across all SOIs and the feature trends from “worse” to “better” as the patient moves from sickness to wellness. Pattern 2, clinicians consider the feature during all SOIs, but there is no trend. Pattern 3, clinicians consider the feature only during patient sickness or wellness. Pattern 4 is absence of data, meaning the feature was never considered in this sample.

- Mental models of features and treatments vary according to SOI (**figure 3 & 4**)
- Four patterns of features emerged regarding how clinicians perceive patient condition (**figure 3 & 4**)
- We can use these perceptions to develop tools to aid communication and decision making (**figure 3 → figure 4 → figure 5**)

Organ Support	SOI	1	2	3	4	5	6	7	8	9	10
Better Quickly		5	8	7	7	3	4	6	1	3	
Better			1	5	4	1	3	3			
Better Slowly					2	1		5	4	1	
Same			1	6	9	7	7	19	12	3	
Worse Slowly				1		1	1	5	5		
Worse				1		1		2	1	1	3
Worse Quickly							4				3

Discussion

Although BICU clinicians think about patients in different ways, we can identify mental models of patient condition and associated treatment priorities.

While patient condition is often viewed similarly, significant variance in perception may exist.

Similar features and treatments are prioritized across the spectrum of illness.

We can use these findings to create ecologically valid tools that better organize and present information to clinicians.

Tools such as the scale shown in **figure 5** may help clinicians expose differences of perspective and may foster improved communication.

These tools may also help to:

- Improve recognition of discordant care;
- Create shared mental models of patient care;
- Aid clinical decision making.

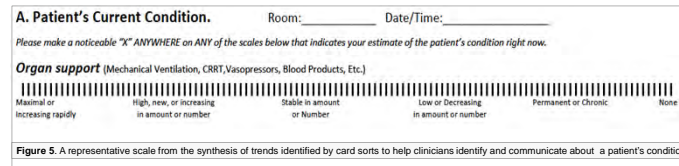


Figure 5. A representative scale from the synthesis of trends identified by card sorts to help clinicians identify and communicate about a patient's condition

Limitations

- Available cards may anchor clinicians to considering only the features or treatments presented in the card sort, even though clinicians were permitted to create unique cards.
- Small sample.
- Data may not be generalizable to other, non-burn ICUs.

Conclusions

Card sorting provides an expeditious, thorough, and valid method of “unpacking” clinician perspectives about patient condition and corresponding treatment priorities.

Acknowledgements

We would like to thank Nicole Caldwell, RN for her instrumental assistance in facilitating this project.

Funding: This project is supported by a grant from the US Army Medical Research and Materiel Command Telemedicine and Advanced Technology Research Center (TATRC) (W81XWH-13-2-0011)

The following co-authors salaries and travel expenses are partially paid for by this grant: Ms. Murray and Dr. Nemeth.

References

- Hannah, S. (2005). Sorting out card sorting: Comparing methods for information architects, usability specialists, and other practitioners. From <http://aim.uoregon.edu/research/pdfs/Hannah2005.pdf> accessed 6 August 2014
- Nielsen, J. (1995). Applying discount usability engineering. Software, IEEE, 12(1), 98–100
- Pamplin JC, Murray S, Chung KK: Phases-of-illness paradigm: better communication, better outcomes. Critical Care 2011, 15:309.

1. United States Army Institute of Surgical Research, Fort Sam Houston, TX; 2. Memorial Hermann Hospital Texas Medical Center, Houston, TX; 3. Parkland Health and Hospital System, Dallas, TX; 4. Applied Research Associates, Inc., San Antonio, TX

Discussion

- Although BICU clinicians think about patients in different ways, we can identify trends in mental models of patient condition and treatment priorities.
- Patient condition and care elements are considered along a spectrum of illness and there is considerable overlap between clinician perception of patient condition and related care elements.
- While patient condition is often viewed similarly, variance in perception exists and is greatest between clinicians from different professions, especially doctors compared to specialty care clinicians like respiratory therapists and rehabilitation specialists.
- Ecologically valid tools such as the scale shown (**figure 5**) may help clinicians expose differences of perspective and may foster improved communication.
- These tools may also help to:
 - Improve recognition of discordant care; and
 - Create shared mental models of patient care by improving team understanding of patient condition and relative care priorities.

- Cards showed fixed categories which may anchor clinicians to considering only the features or treatments presented in the card sort, even though clinicians were permitted to create unique cards.
- Small number of clinicians providing input on small number of patients.
- Data may not be generalizable to other, non-burn ICUs.

Conclusions

- Card sorting provides a reasonably expeditious, thorough, and valid method of “unpacking” clinician perspectives about patient condition and corresponding treatment priorities.

- We would like to thank Nicole Caldwell, RN for her instrumental assistance in facilitating this project.
- Funding: This project is supported by a grant from the US Army Medical Research and Materiel Command Telemedicine and Advanced Technology Research Center (TATRC) (W81XWH-13-2-0011)
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2. Nielsen, J. (1995). Applying discount usability engineering. *Software, IEEE*, 12(1), 98–100
3. Pampin JC, Murray S, Chung KK: Phases-of-illness paradigm: better communication, better outcomes. *Critical Care* 2011, 15:309.

Please make a noticeable "X" ANYWHERE on ANY of the scales below that indicates your estimate of the patient's condition right now

Maximal or Increasing steadily	High, new, or increasing (eg, aneurysm, or aortic)	Stable in amount or fluctuates	Low or Decreasing in amount or fluctuates	Permanent or Chronic	None

Figure 5. A representative scale from the synthesis of trends identified by card sorts to help clinicians identify and communicated about a patient's condition

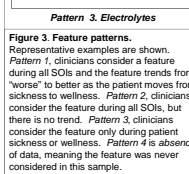


Figure 3. Feature patterns. Representative examples are shown. *Pattern 1*, clinicians consider a feature during all SOLs and the feature trends from "worse" to better as the patient moves from sickness to wellness. *Pattern 2*, clinicians consider the feature during all SOLs, but there is no trend. *Pattern 3*, clinicians consider the feature only during patient sickness or wellness. *Pattern 4* is absence of data, meaning the feature was never considered in this sample.

Organ Support	SOI	1	2	3	4	5	6	7	8	9	10
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Better				1	5	4	1	3	3		
Better Slowly						2	1		5	4	1
Same			1	6	9	7	7	19	12	3	
Worse Slowly					1		1	1	5	5	
Worse				1		1		2	1	1	3
Worse Quickly								4			3

[illegible]

Figure 4. Data demonstrates how clinicians perceive trends in organ support that “worsens” as patients condition deteriorates and how certain care elements are more associated with conditions of sickness or wellness. SOI, Severity of Illness. N.B. to highlight trends more clearly, these tables include data available from 2 sites (1 military 1 civilian)

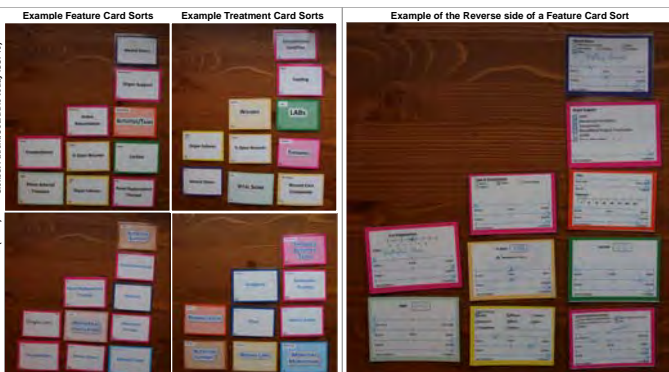


Figure 1. Comparison of feature and treatment card sorts for the sickest and least sick patients. The ultimate card sort is a visual representation of the priority clinicians place on information or treatment categories they use to understand and care for patients where the bottom left card is the "most important" and the top right card is "least important" of the cards selected. *SQL: Severity of Illness.*

APPENDIX H. Accepted ABA Abstracts

See Next 2 Pages

ABSTRACT 1

Title: Comparing the workload perceptions of determining patient condition and priorities of care between burn providers in three burn ICUs.

Sarah Murray, MSN1
Maria Serio-Melvin, MSN1
Jay K. Aden, PhD1
Elizabeth Mann-Salinas, PhD1
Kevin K. Chung, MD, FCCM, FACP 1
Todd Huzar, MD2
Steven Wolf, MD, FACS3
Christopher Nemeth, PhD4
Jeremy C. Pamplin, MD, FACP1

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3. University of Texas – Southwestern Medical Center, Dallas, TX;
4. Applied Research Associates, Inc., Fairborn, OH

Introduction

Multidisciplinary rounds (MDR) in the Burn Intensive Care Unit (BICU) serve as an efficient means to review patient status and plan care. To do that, clinicians must identify patient condition and determine care priorities. Both require cognitive work that clinicians often do not recognize. We sought to characterize clinician subjective sense of cognitive workload while completing these tasks, using the National Aeronautics and Space Administration Task Load Index survey (NASA-TLX). This survey assesses and summarizes the perception of workload on six 100 point scales (mental, physical, temporal, performance, effort and frustration).

Methods:

Research staff at 3 academic regional referral centers administered the NASA-TLX to clinicians during MDR. Surveys were administered immediately after MDR was completed for a single ICU patient. Clinicians assessed their workload associated with 1) "Identify[ing] if the patient is better, same, or worse than yesterday" and 2) "Identify[ing] the most important objectives of care for the patient today." Data were collected on clinician type, years of experience and hours of direct care of patient.

Results

Surveys were administered to 154 total clinicians (Site 1: 64, Site 2: 62, and Site 3: 28). There were a total of 17 patient rounds assessed by 21 staff physicians (Site 1: 13, Site 2: 1, Site 3: 7), 27 nurses (Site 1: 11, Site 2: 6, Site 3: 10), 17 residents (Site 1: 8, Site 2: 3, Site 3: 6), 35 in other roles (Site 1: 8, Site 2: 11, Site 3: 16), and 13 students (Site 1: 13, Site 2: 0, Site 3: 0). Clinicians with less than 5 years of experience reported significantly more work for both tasks than those with more experience ($p < .0001$). Clinicians in the other group (respiratory therapists, dieticians, pharmacists, etc.) reported more work than all other groups for both tasks ($p < .0001$). Institution and hours of care did not influence the perception of workload for either task.

Conclusions

The work of identifying patient condition and treatment priorities varies according to clinician type and experience level, but not by institution or the time spent caring for a patient.

Applicability of Research to Practice

Identifying patient condition and treatment priorities may affect workflow, decision-making, communication and teamwork. Understanding how various clinical roles perceive cognitive workload differently could improve clinician and team performance.

ABSTRACT 2

Title: Discovering mental models that burn ICU clinicians' use for decision making using card sorts.

Jeremy C. Pamplin, MD, FACP¹
Sarah Murray, MSN¹
Maria Serio-Melvin, MSN¹
Jay K. Aden, PhD¹
Elizabeth Mann-Salinas, PhD¹
Kevin K. Chung, MD, FCCM, FACP¹
Todd Huzar, MD²
Steven Wolf, MD, FACS³
Christopher Nemeth, PhD⁴

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2. Memorial Hermann Hospital Texas Medical Center, Houston, TX;
3. University of Texas – Southwestern Medical Center, Dallas, TX;
4. Applied Research Associates, Inc., Fairborn, OH

Introduction

Differences in the perception that Burn ICU clinicians have about patient condition and treatment priorities impedes effective collaboration and can impact patient outcomes. Better understanding of clinician perception about patient condition and treatment priorities could improve care and communication. Card sorting is an efficient, inexpensive way to understand perception, by learning about tacit mental models. We hypothesized that card sorting might elicit clinician mental models about information and treatment priorities.

Methods:

This was a prospective, mixed methods study of clinicians in two academic, regional referral burn ICUs. We developed a card sort based on interviews with burn critical care experts. The final card set included 10 categories of “features” used to judge patient condition and 9 categories “treatments,” for a total of 97 cards: 67 features and 30 treatments. Clinicians were asked to identify a patient's condition on a scale from “could die today” to “could transfer today,” then to examine feature or treatment cards, select cards they considered important, and to arrange them by priority in a grid. If an element important to them was missing, they could create a card for it. Figure 1 is a representative card sort.

Results

We performed card sorts with 133 burn ICU providers (60 at site I and 73 at site II) including 19 staff physicians, 54 nurses, 29 residents, and 31 clinicians in other roles. Average time to complete a card sort was 35 minutes. The way clinicians prioritized information in decision making varied depending on their institution, professional background, experience, and the patient's condition. Figure 2 shows two distinct word clouds—graphical depictions of term importance or frequency-- depicting differences in the mental models burn ICU care providers use while caring for critically ill patients.

Conclusions

Card sorting revealed differences between the mental models that burn ICU care providers use to assess patient condition and determine treatment priorities. The card sort method can successfully elicit mental models from clinicians during routine daily activity.

Applicability of Research to Practice

Understanding clinicians' mental models can be used to develop ecologically-valid tools that can improve decisions and communication in the work domain they are intended to support, such as the two burn ICUs in this project.



Figure 1. A representative card sort



Figure 2. Information prioritized by clinicians when assessing patient condition.

APPENDIX I. Quad Chart

See Next Page

The Phase of Illness Paradigm: A Checklist Centric Model to Improve Patient Care in the Burn Intensive Care Unit
ERMS/Log Number: 12340054
W81XWH-13-2-0011



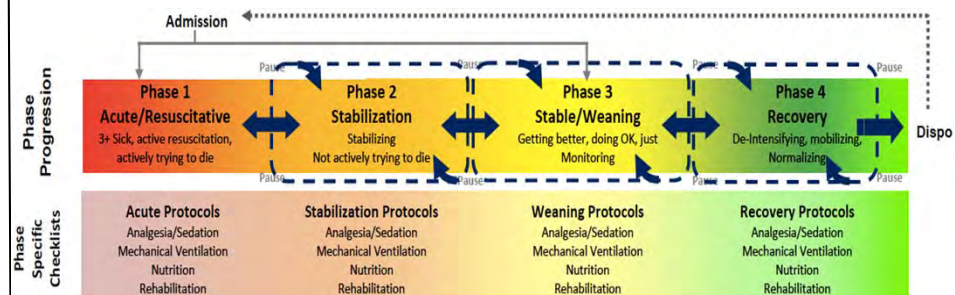
PI: LTC Jeremy Pamplin, MD **Org:** The Geneva Foundation/San Antonio Military Medical Center **Award Amount:** \$540,555

Study/Product Aim(s)

- A validated POIP model.
- Improved healthcare team understanding of patient condition and priorities of care.
- Improved task completion according to patient phase of illness improves outcomes and reduces complications.
- More reliable, consistent, and efficient care will reduce costs.
- The POIP will improve communication and teamwork and will reduce cognitive load. These benefits will improve clinician work related to quality of life.

Approach and Military Relevance

This multicenter, prospective, case-matched cohort study will improve the care of critically ill burn patients. Lessons learned from the application of this paradigm may be applied to other MHS patient populations to improve evidence based care, decrease communication failures, improve patient safety, better use resources, and reduce costs.



The Phases- of- Illness Paradigm (POIP). Patients enter the ICU for organ support or monitoring. Movement through the continuum is fluid, timeless, and directionless. Patients getting better move right and patients getting worse move left. Checklists identify supportive care goals and therapies. The "Pause Cloud" is an "in-between" phase when it is unclear what "direction" a patient is moving (i.e. could be getting better or getting worse). Supportive care goals in a pause are the same as for the patient's most recent phase.

Timeline and Cost

Activities	13	14	15	16
Checklist Development				
POIP Implementation				
Data Collection				
Ongoing Review and Checklist Update				
Estimated Budget (\$541K)	\$156K	\$207K	\$178K	

Updated: 08 January 2015

Goals/Milestones

CY13 – Project Initiated

- ☒ Data collection: TeamSTEPPS, NASA-TLX, CUS and CCST – Completed: Core site 20140303; Houston 20140627; Dallas 20141003
- ☒ Group Interviews – Completed: Core site 20140501; Houston 20140716; Dallas 20141218

CY14 – POIP Applied and Data Collection Initiated

- ☐ Iterative Checklist Development – Completed Core 20140930 & Houston Sites 20141209. Ongoing at Dallas Site
- ☐ POIP Education and Implementation: Completed: Core site 20140908; Ongoing Houston; Pending Dallas

- ☐ Data Collection: Ongoing per protocol
- ☐ POIP Checklists Reviewed and Revised

CY15 – Project Completed

- ☐ Updated POIP Checklists introduced
- ☐ Data collection completed